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RISK, DECISION FRAMES, AND EXPERIENCE: IMPACT AND RELATIONSHIPS IN A MILITARY SETTING

by

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and

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I. INTRODUCTION

A. BACKGROUND

Within the Department of Defense (DOD) military officers are confronted with a wide variety of decisions which require either near term or long term resolution. The context of these decisions is equally varied, ranging from administrative decisions routinely experienced in the civilian business world to combat decisions with very different ramifications than those of civilian managers.

Consider the newly commissioned officer serving in Vietnam who was suddenly confronted with decisions about how to best deploy his platoon on a search and destroy mission. The choice dilemma for this officer becomes one of dispersal of troops thereby increasing the potential for encounter (mission goal) against less dispersion which increases the safety of his troops. Further consider the Division Commander who is given limited resources to allocate between competing needs such as equipment maintenance and operational training. The choice dilemma for this officer becomes one of trade offs between troop readiness and equipment readiness.

Because of the possible outcomes resulting from these decisions, potential loss of life in the case of combat decisions, the military places a high premium on assessing the effectiveness of an officer's decision making. In fact, the ability of an officer to make timely, well-considered and effective decisions is a criterion which is subjectively measured as a part of an officer's performance evaluation. [Ref. 1]

By far the preponderence of these evaluations have concentrated on the outcomes or results of an officer's decisions. There is an obvious propensity for evaluators to rate decision making ability based solely on the success of the decision. Although the success of a decision is demonstrably important, a more complete understanding of the operative decision making process may be useful in assessing an officer's decision making ability.

Understanding the processes underpinning an officer's decision making behavior requires an examination of the psychological principles which govern this process. The generally accepted theory utilized to explain this process is that people make decisions based on their subjective calculation of the relevant risks associated with each alternative considered. In essence, the decision maker calculates the expected value each alternative will provide, then the rational decision maker selects the alternative which offers the highest value. The use of this expected value model has promoted an interest in categorizing decision makers according to their preference for risk. A risk averse decision can be thought of as a decision where the certain alternative is preferred to an alternative which has equal or greater expected value but involves more uncertainty. For example, the investor who puts his money in a bank at lower fixed interest rates, rather than a mutual fund at historically higher rates but with less security than the bank can be viewed as risk averse. In contrast, a risk aggressive decision is one in which a riskier alternative is preferred to another alternative which is less risky but offers equal expected value to the decision maker, such as the investor

who invests money in stocks rather than in bonds. The expected value of each investment option may be the same, but unstable fluctuations in stocks may dramatically alter the value of this investment either up or down while the bonds have guaranteed stability.

While significant research has been concentrated on measuring or identifying risk trends as an independent variable in the decision making process, little effort has been expended in adapting this research to the military environment. The very nature of the military profession requires that the military officer be prepared to confront decisions involving a great degree of personal and professional risk. It seems logical to assume that these officers should be psychologically prepared to accept a greater degree of uncertainty and risk in the decisions they make. Given this need for psychological preparedness, the military environment may develop or promote attitudes towards risk unique to its profession. For example the military might reward the officers who are typically risk aggressive rather than cautious in the decisions they make. Additionally, the type of decisions confronting officers may alter their decision process. They may have one type of preference for risk in combat and another in administrative decisions. This research builds upon previous decision-making research as a basis to explore risk preference in the military and determine if these preferences vary systematically by variable such as rank, source of commission, and combat experience.

B. RELEVANT ISSUES

A military officer exists in a risk prone setting. Tremendous responsibility for the total welfare of other individuals typically rests on the military officer as well as responsibility for the proper allocation of limited resources. Despite the ostensible training and multitude of official regulations designed to strictly guide his activities, the military officer is frequently confronted with an environment rife with uncertainty.

The decisions characterized by risk and uncertainty which a military officer faces can be divided into the three broad but distinct categories of combat, financial and career. A more explicit discussion of the similarity between risk and uncertainty in this context is provided in the Literature Review chapter.

The combat decision is perhaps the most unique and compelling event for military officers. The combat decision encompasses the essence of the military decision dilemma. There are the lives of your own subordinates, the mission, national purpose, the officer's own life, and frequently the lives of innocent bystanders that must be considered and kept in perspective. Despite this importance in terms of lives, there are no prescribed guidelines which quantify all the variables relevant to the decision. The intangibles such as fear, pride, leadership, and survival all contribute to confound the military decision maker. This interaction of conflicting physical, psychological, and moral precepts makes any combat decision inherently uncertain and personally risk intense.

Many military financial decisions are also typified by a high degree of risk. Despite public opinion about military excesses, the individual military officer has limited resources to satisfy requirements which generally exceed what is feasible. Given limited resources, every decision involving these resources should be optimized. This optimal level of execution is necessary not only from a professional desire to accomplish an assigned mission (organizational effectiveness), but also to a great extent in response to the extensive scrutiny that resource decisions receive in the military. Oversight of these decisions is routinely exercised by a variety of sources including the public, audit agencies, Inspector Generals, Congressional inquiry, resource sponsors, and other military organizations competing for resources. Under this intense limelight the ramifications of a resource decision viewed as inappropriate poses great personal and organizational risk for the military decision maker.

Implicit in any decision officers make (including combat and financial decisions) is the realization that the outcomes may have a significant impact on their careers. The military career environment is unique in its historical application of the "up or out" philosophy. This engenders a system which requires officers to demonstrate potential beyond their current level in order to be successful in a career sense. Sustained excellence only on par with the current level shows limited potential and will typically end a military officer's career. The dwindling number of senior officer positions (as reflected in the pyramid rank structure) creates an atmosphere of intense competition for promotion within the system. So intense is this competition that a single bad efficiency

report (OER) will stigmatize an officer's overall performance to the extent that he will probably be passed over for promotion. In many instances an OER could be considered "bad" if it has average or typical marks in a few key blocks. This "up or out" philosophy taken in the context of the personal and professional investment which the officer has established in a military career creates situations where every decision is potentially career jeopardizing. For a military officer a decision involves not only the immediate environment of the decision, but also the attendant risks associated with long range career aspirations.

C. HYPOTHESIS

The central research question is whether military officers demonstrate consistent preferences for risk in the decisions they make. Do they change their preference for risk based on the decision context they are confronted with? For example, officers may be risk aggressive for combat decisions but risk averse for financial decisions. Alternatively they may not display any consistent pattern at all within these decision frames.

In the combat decision frame it is plausible that the officer in the 0-1 paygrade will be much more risk averse than the 0-6 officer* and that there will be some curvilinear relation in between. This belief is based on the relative inexperience of the 0-1 in combat situations. It seems reasonable to expect that a junior officer will be faced with a higher level of uncertainty in a combat situation than a senior officer

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*For the purposes of this study, 0-6 and above officers were considered "successful" from the standpoint of career accomplishment and were assumed to provide similar responses. Consequently this data was grouped in order to enlarge the data base of this smaller population.

will be. The junior officer's mastery of the military skills, his relative comfort with his personal convictions, as well as his lack of organizational awareness, will increase the intensity of the apparent risk as compared to that experienced by the more senior officer.

In the context of financial decisions it is hypothesized that junior officers will be more aggressive than senior officers. The lack of experience the junior officers possess in this decision frame may make them prone to exposing themselves to the risky choice. The reason inexperience is expected to cause junior officers to be averse in the combat decision frame and aggressive in the finance decision frame relative to more senior officers is because it is expected that the different ranks will perceive the magnitude of the consequences differently in each of the decision frames. In the combat decision frame, the threat of life loss is expected to weigh more heavily in the final decision of the junior officers as compared to the mission which is expected to be most prominent in the minds of the more senior officers. In the finance decision frame the career consequences and awareness of scrutiny is expected to influence the decision of the more senior officers towards the risk averse alternative more often than less experienced officers. In other words, as the officer becomes more senior, it seems plausible that a more conservative course of action would be followed, due in part to the awareness of scrutiny and the severe consequences of improper decisions within the financial decision frame.

Within the career setting it is hypothesized that the junior officer is typically risk aggressive. This is expected because they are generally unaware of the relationship between the decisions they make and their

career. At this point it is unlikely they have even formulated a concrete understanding of what a career is in the military sense. Their focus is predominantly short range or immediate considerations. In contrast, it is expected that midrange officers (0-3, 0-4) would be more risk averse than the junior officers. These officers have synthesized their personal and professional needs to the point that they have decided on the military as a career. They would therefore tend to be cautious in the decisions that may impact adversely on their career expectations. It is believed that more senior officers will exhibit a more risk aggressive profile. In a sense they have attained their "career" so they may be inured to the sense of risk as it relates to career decisions.

D. THESIS METHODOLOGY

In order to adequately address the hypothesis postulated, as well as the central research question, the thesis is organized into functional chapters consisting of Literature Review, Methodology, Results, and Conclusions, Qualifications, and Recommendations.

The Literature Review chapter provides a synthesis of important theories and concepts, as well as previous research which is essential to understanding or appreciating the complexities and interactions of risk in decision theory. The primary focus of this review is on research efforts and studies which examined changing risk preferences and the variables which may be related to these changes. These references provide the basis for the development of our decision questionnaire which is designed to measure risk preferences in a military setting.

The best method for acquiring the data necessary to determine the validity of the central research question and hypothesis was determined to be the administration of a questionnaire. As elaborated in the Methodology chapter, unique military questions were developed and the general approach was to survey a broad cross section of Army Officers to obtain an indication of their preferences for risk within the specified decision frames. These preferences were then analyzed by a variety of statistical techniques to generate results, conclusions, and implications.

The overriding concern of the Results chapter was to provide a simple straight forward presentation of the significant results obtained during the research. This includes a more in depth discussion of the particular statistical methods used as well as the significance of the noted results.

The Conclusions chapter addresses the specific research hypothesis and research questions in terms of the results found in the research. In addition, the implications of these results for the military in general and the Army in particular are provided. An effort is made to draw together the results of this research with previous research efforts. Finally in this chapter, the limitations of the general research methods, the results reached, and general recommendations for follow-on research based on this study are provided.

II. LITERATURE REVIEW

A. CONCEPTUAL THEORY

Inherent in any review of the literature applicable to this research project is an appreciation that consideration should be afforded to providing an acceptable definition of risk as well as the more extensively studied process of decision making. The only universally accepted definition of "risk" is found in the dictionary. This simplistic but intuitively appealing definition essentially says that risk is a chance of encountering hazard or peril, or the exposure to such a chance. [Ref. 2] Risk is a concept which is frequently referred to in normal everyday social interchange and is included in research concerning decision making. Risk is a part of living and is present to a greater or lesser degree in everything we do or may contemplate doing in today's world. "Most accidents happen within 25 miles of home . . .", "Slow down . . .", "Be careful crossing the street . . ." are all examples of how risk is addressed indirectly in everyday life. The implication being that failure to heed the warning will increase the personal risk towards some accident in these examples.

These transparent examples are intuitively obvious and probably serve as the basis for the common dictionary level understanding of the concept of risk. However, this explanation of risk has proven to be inadequate in its application in decision theory. A significantly more robust and esoteric understanding of risk was provided by Bugental's reflection "I am saying that each man lives his life in the midst of a contingency . . . I

do not know, I cannot know enough to be safe, to be secure, to predict with complete confidence from one moment to the next . . . anxiety is my recognition that I do not know all that I need to know to protect that which I love and forestall that which I fear." [Ref. 3]

At an even higher order of conceptualization, Hampden-Turner in 1970 developed a theory of psychological development in which risk was an integral part. He felt that in order for an individual to grow intellectually as well as socially he must "open" himself to different risks. By doing so, the individual may risk personal or intellectual criticism in order to gain a more developed sense of personal worth. One can not reach this level without temporarily surrendering and risking permanent loss. In this view, Hampden-Turner characterized the creative person as being a bigger risk-taker and based this on research showing higher levels of adolescent self-esteem related to greater risk-taking. [Ref. 5]

The most extensive review of the subject of risk is found in the unpublished doctoral thesis "Phenomenology of Risk" by Dr. Gib Akin. This work is an attempt to develop a more complete meaning of risk as a human phenomenon by providing an experiential referrent to supplement our practical as well as psychological understanding of risk. This is an experiential understanding, where risk is presented as a fundamental structure of human accomplishment, as a particular method for engaging the daily events one confronts. [Ref. 4]

A more pragmatic definition of risk was developed by Frank Knight. He believed that the key to understanding risk was related to man's inability to predict the future and imperfections or limitations in man's knowledge. He characterized risk taking as action in the face of

uncertainty. He suggested that we establish probabilities because of our inability to measure with certainty all of the relevant conditions confronting us. Therefore decisions involving risk are characterized by probabilistic outcomes so one makes a subjective probability judgment and an estimate of how good that judgment is in calculating the action they will take. In this sense probabilities are assigned to each alternative and then one forms a confidence interval around each probability. For example, the football player handicapper may make one team the favorite, but he may only be 60% confident in his selection.

Knight also developed a model for measuring risk-taking that has been adopted by other researchers. His paradigm equated risk and uncertainty where "uncertainty can be treated as cases of choice between smaller reward more confidently and a larger reward less confidently anticipated." [Ref. 7]

The relationship between risk and uncertainty is prevalent throughout the literature where uncertainty is usually referred to as the context of the amount of information available about the consequences or outcomes of the alternatives. In this vein, decision situations are often distinguished on the basis of the amount of uncertainty inherent in each alternative. For example, if for each alternative considered the related outcome is precisely known, the situation is one of decision under conditions of certainty. If the relative likelihood (probability) of any outcomes that may occur is known, the situation may be described as one of objective risk. If only possible outcomes are known and their relative probabilities are unknown, the case is one of uncertainty. While the classification of the objective risk situation is intuitively appealing, it seems equally consistent to classify situations of uncertainty as a decision

involving subjective risk. This connection between uncertainty and subjective risk is made because it is felt that the decision maker faced with an uncertain situation will make a subjective evaluation, often subconsciously, of the likelihood associated with each alternative. [Ref. 6]

Richmond [Ref. 8] also suggested that managers are confronted with several types of decision situations, differentiated by the extent and kind of information available. He characterized one of these situations as decision making under risk. This is typified when the manager, although he is not certain what will happen as a result of his decision, is still able to assign subjective probabilities to the possible outcomes. The usual process for determining the appropriateness of an alternative is to determine its subjective expected value or utility. This is accomplished by multiplying the subjective probability that the outcome will occur by its expected value or utility. In this context, a utility is a number that represents the level of satisfaction that an individual receives from a particular choice. The rational decision maker will try to optimize his decision by choosing the alternative with the highest value. This process or mode is usually referred to in the literature as calculating the expected value or utility theory. For example, suppose a person entered a contest and was given the choice between two alternatives. One alternative offers a 70% chance of attaining a $100 prize, and the other alternative offers a 30% chance of winning a $200 prize. Under this model, the rational decision maker would choose the first alternative as it yields the greatest expected value (i.e., 70% x $100 = $70 vs. 30% x $200 = $60). [Ref. 29]

The expected utility model is the most widely used and recognized theory which describes the manner in which most decisions under situations characterized by uncertainty are made. This model has face validity for many decision makers since it is rational and easy to understand. In support of this, Patten et al., [Ref. 14] have shown that the use of utility theory to measure risk taking attitudes is feasible and concluded that these attitudes were not situation or scenario dependent. Their study, relying on a battery of tests, combining personality, utility and risk-taking measures, supported their findings.

Despite its intuitive appeal, the expected utility model has been widely criticized as simplistic and not germane to various situational and psychological variables. In essence it essentially relies on the manager "playing the odds." Koontz and O'Donnell [Ref. 9] pointed out that managers do not rely exclusively on a calculation of the odds since "most managers understandably influenced by the dangers of failure, tend to be, to some extent, risk averters and do not, in fact, play the averages so statistical probabilities are not good enough for practical decision making." [Ref. 9]

Hogarth was critical of the expected utility model's treatment of uncertainty and the decision makers' ability to assign the necessary subjective probabilities required for the calculation of the expected utility. He concluded that "man is a stepwise information processing system with limited capacity, and is ill-equipped for assessing subjective probability distributions. Furthermore, man just ignores uncertainty. The psychological reduction of uncertainty is in itself a useful cognitive simplification mechanism. The notion that events are uncertain is both uncomfortable

and complicating. Indeed, even in the supposedly rational world of business, there is evidence that businessmen are averse to admitting uncertainty." [Ref. 15]

One of the most straight forward and useful explanations on the subject was developed by Tversky and Kahneman in their article on "Judgement and Uncertainty: Heuristics and Biases". In this article they attempt to look at how people evaluate uncertainty and what actions people take to reduce or avoid uncertainty which they feel is a property of the environment rather than within themselves. They found that people rely on a limited number of heuristic principles such as anchoring, representativeness and availability to reduce the complex tasks of assessing probabilities and assigning values to simple judgmental operations. While useful in reducing uncertainty or risk, these heuristics routinely bias the judgmental process and can cause severe and systematic errors. [Ref. 16]

Another important study by Slovic [Ref. 13] showed that research subjects when confronted with choices of equal utility resolved this dilemma by selecting the alternative which was superior on the more important dimension. Basically the decisions were made on aspects which were easy to justify, while vague or more complicated aspects were neglected. This study supports Tversky's work on elimination by aspect.

Grether and Plot [Ref. 12] found preference reversals in decisions were made under conditions which were controlled for psychological and economic variables; this was contrary to the traditional utility theory. They believed these reversals could best be explained by the specific context or changes in context in which the decision was made. For example, the mode of response or the phrasing of the question influenced the choice.

Expanding on their earlier work, Kahneman and Tversky [Ref. 11] presented a critique of expected utility theory which emphasized several inconsistencies in the use of this model of decision making under risk. They found that people tended to undervalue outcomes which were only probable in comparison with outcomes obtained with certainty. For example, they conducted a number of studies where subjects were asked to choose between two alternatives with different expected values. In one instance the choice was between an 80% chance of $4000 or a certain $3000. Despite the higher expected value of the first alternative, i.e., $3200, 8 out of 10 respondents were risk averse in selecting the certain outcome of $3000. If instead the signs of the outcomes are reversed so that gains are replaced by losses, in the example just provided, 92 out of 100 respondents selected the risk aggressive choice of an 80% chance of losing $4000. Kahneman and Tversky called this the "certainty effect" and felt it contributes to risk aversion in choices involving sure gains and risk aggressiveness in decisions involving sure losses. In addition, closely related to the certainty effect, Kahneman and Tversky presented some alternative explanations of decision behavior which varied from the traditional expected value theory. These included the reflection effect, and the isolation effect, all of which contribute to inconsistent preferences when the same choice is presented in different forms.

A significant portion of Kahneman and Tversky's research dealt with the manner in which subjects alter their preferences based on the way a decision is framed. A simple but graphical example involves the manner in which the costs associated with credit card purchases are presented to consumers. Consumers are more willing to forego a cash discount and use a credit card

if the charge is included in the price than if the consumer is offered a cash rate with a credit-card surcharge. Studies have shown that the different labels induce different reference points resulting in the preference reversal. Kahneman and Tversky labeled this phenomenon as reversals due to differing framing of outcomes.

Another example of preference reversals was linked to different framing of the contingencies associated with a decision. In the case of property insurance, studies have shown that consumers alter their preference for various types of insurance policies based on the manner in which certain aspects of the policies are framed. People would be more apt to purchase a $100 insurance policy characterized as providing full property protection against fire than a policy of the same price which is characterized as limited property protection since it has no protection against flood but still has full coverage against fire. In this case both policies offer the same level of protection, but the first policy is framed in a more appealing manner by highlighting the fire protection aspect.

As a result of their findings involving the certainty effect, the isolation effect, and preference reversals due to decision frames, Kahneman and Tversky developed an alternative theory of choice in which value is assigned to gains and losses rather than to final assets and in which probabilities are replaced by decision weights. They labeled their model as the "prospect theory" and felt it best explained several of the types of preference reversals which systematically violate the axioms of the expected utility theory.

B. APPLICATION

A major emphasis in the empirical study of risk has been to find the determinates of risk-taking behavior or more precisely what variables impact on this behavior. To this end a significant number of experimental studies have been conducted by changing a number of variables hypothesized to be relevant and then noting any change in risk-taking behavior. Prominent among these studies is the work done by Kogan and Wallach [Ref. 17], the basis of their effort being relevant moderating variables. They seemed most interested in cognition and personality variables and studied risk taking to learn about the "psychology of thinking in its broad outlines."

In order to determine which variables were relevant, Kogan and Wallach developed a choice dilemma instrument designed to measure levels of risk-taking. In this instrument seven procedures or situations were described and the subject was then asked to advise a fictional person facing a dilemma. For example, one question poses the dilemma of Mr. A, an engineer who has a secure job at a modest but adequate salary. He has however, been offered a job with a newly formed company with no established future. The new job would pay more to start and offer several additional incentives if the company prospered. The subject is then asked to report the lowest probability of success that he would consider acceptable to make it worthwhile for Mr. A to take the job. [Ref. 4]

In general terms, Kogan and Wallach conclude that there are two sources which explain the tendency towards risk or conservatism in the decision-making sphere, motivation and cognition. Given these sources, their questionnaire demonstrated general and consistent personal proclivities for risk taking.

Kogan and Wallach's initial work spurred numerous other studies, one of which was Stoner's work on the risky-shift. He discovered that after group discussions of a number of problems, the group consensus decisions tended to be more risky than the individual decisions were prior to group discussions. He then coined this as the risky-shift caused by the group process. A large amount of research was produced concerning the process and determinates of the risky-shift, but many conflicting results have been published. Most of the current efforts have ignored the notion that groups take more risks than individuals and have concentrated on analyzing the mechanisms at work in group discussions. [Ref. 18]

In 1962, Slovic attempted to measure risk-taking tendencies by correlating nine variables such as response sets, job preference, gambling preference, life experience and peer ratings of subjects. The correlation among Slovic's risk-taking measures were generally not significant, indicating a lack of convergent validity. [Ref. 19] Slovic explained the lack of consistency among the separate measures by contending that "risk is a multidimensional concept and most of the presumably 'risk relevant' measures have been tapping these dimensions differently." [Ref. 27] He felt that "willingness to take risks may not be a general trait at all but rather one which varies from situation to situation within each individual." [Ref. 27]

One of the variables Slovic studied was a response set which measures a general tendency to respond in a predicted manner, no matter what the stimulus condition or situation. For example, Slovic used a questionnaire to which individuals could answer either quickly or accurately based on the assumption that risk aggressive people would respond quickly, and risk averse people accurately.

In studying the application of risk-taking in decision making, the most common technique for measuring risk preferences typically involves the use of a gambling scenario. In these studies, gambles using either real or imaginary bets have been conducted by Slovic, Fischhoff, Tversky, Kahneman, and Lichtenstein which relate to this research effort.

Studies designed to measure peer ratings usually involve having people assess whether subjects who are familiar to them are risk-takers or not. Some research has been done (Dyer and Stern 1957) using a self-assessment technique where people were required to state whether they perceived themselves to be risk takers. This self-reporting has tended to produce biased results in that "on the average, individuals view themselves as riskier than their peers." [Ref. 21]

Johnsgard and Ogilvie have conducted research related to the personality traits of high risk sportsmen. They administered personality tests and developed a profile which showed "The data thus far lends no support to the notion that he is bent on self-destruction. He is not particularly guilt-prone and externalizes his aggressiveness to a greater extent than others. He is not a neurotic individual." [Ref. 23]

Rosenthal [Ref. 24] studied the physiological aspect of people who engaged in risk-oriented activities. He found that people who engage in sports known as risky (polo, skiing, mountain climbing, racing, etc.) experienced a high degree of exhilaration and the feeling of well-being shortly after the activity in contrast to non-risky sports. He felt that there was a positive correlation between longer, healthier life and involvement in risky activities, and that people were more creative and productive after involvement with a risky activity.

Finally Klausner [Ref. 25] studied two variables, fear and enthusiasm in parachutists. They developed a dynamic model in which a buildup of fear is converted to enthusiasm. This change occurs when the jumper passes the point of no voluntary return. The person willingly puts himself in the risky situation and then resigns himself to fate, with the conversion being the most important process. He found that "the greater degree of fear which the person can generate in himself, the greater the enthusiasm he will experience; thus there is a motivation for seeking danger."

Other prominent variables which have been studied for their relationship to risk-taking include age and sex. Kogan and Wallach [Ref. 17] found that risk aversion varied directly with age, but apparently does not systematically vary with sex. However, Slovic [Ref. 26] studied risk-taking in children and found a sex difference in risk-taking along the norm of our cultural stereotype: boys were bolder than girls.

Despite the wide scope and number of risk-taking studies conducted in the civilian community there have been few studies conducted using military subjects. Perhaps the most significant study involving military personnel was an unpublished thesis done at the U.S. Army Command and General Staff College which applied Kogan and Wallach's choice dilemma questionnaire in a military environment. The general purpose of this thesis was to see if military officers were more risk aggressive than civilians. The principle findings were inconclusive as younger officers were more risk aggressive than civilians but older officers were more risk averse. In addition to these results, several important features relating to military officers were reported. In particular, significant

variances in risk preference were noted for several demographic features such as age, marital status and source of commission.

Perhaps the most salient point of the research reviewed is that there is no single unifying concept or theory of risk in decision-making which induces a measure of consensus, nor is it felt that there must be. The amorphous nature of the psychological processes involved and understandable limitations on the ability to interpret these processes, make this a difficult if not impossible proposition. It is not intended to solve this dilemma with this research effort. It is also not intended to propose a unifying theory nor even to develop a new theory on risk in decision making. Rather, it is hoped to apply this rich and varied body of existing studies to the military environment with this research effort. For example, many of the variables included in Slovic's studies, such as job preference and experience, as well as some of the psychological motivations alluded to will be used to analyze and critique the relevance of the results obtained in this research effort. If risk in decision-making is prevalent in our everyday life, it is a component of the military officer's existence in a unique and meaningful way. It is hoped to critique the previous research efforts by reviewing how risk in decision-making interacts with military officers. With this effort it is expected to add some new insight to the existing research.

III. METHODOLOGY

This chapter provides an overview of the specific research techniques used to collect and empirically analyze data relevant to the central research question and hypothesis. The chapter is broken down into five major sections which range from the Sample Selection procedures used to identify the target population, through Analytical Techniques relied on to evaluate the data collected.

A. SAMPLE SELECTION

In order to test the beliefs discussed in the hypothesis, the study population had to be determined and a representative sample selected. It was decided that the general discussion of risk behavior in military officers would be limited in application to army officers. This self-imposed restriction was placed in order to have a more manageable population with potentially more meaningful results.

It was important that the sample represent a significant variety of career and job positions to ensure that a mix of combat, combat support, and service support officers would be included. A convenient data base with a representative cross-section of army officers was available through the Fort Ord California personnel office. This data base, in the form of a computer printout which could be utilized as a mailing list, contained over 2000 officers located from Los Angeles to San Francisco, California, and included some basic demographic information.

While the computer listing was considered reasonably representative, one concern was to ensure that a sufficient spread in paygrade (0-1 to 0-6

and above) would be included. In particular, we thought that the paucity of O-6 and above officers included in the computer run could bias conclusions drawn from their sample. A heuristic of a minimum of 20 responses per paygrade was established to alleviate this concern, and a purposive sample of the O-6 and above group was drawn from the Washington, D.C., area to augment the original sample. Additionally, a purposive sample of finance officers was obtained from Fort Benjamin Harrison to supplement the listing in order to analyze financial officer responses to the finance questions.

It was recognized that our survey base was predominantly from the geographical area of California, but the convenience and access this population afforded was an overriding concern. Further, the rotation practice of the Army is such that it is assumed that the California officer does not significantly vary from the larger army officer population of which he is a member. Additionally, this survey was largely administered to what is considered a typical army post (Fort Ord) with a mix of line and support functions. Therefore, it was our assumption that there would be no invalidating geographical bias.

The selection process was governed by a desire to achieve a sample size which was generally representative of the army officer population. For sampling purposes, the aggregate army officer population was rounded to 80,000. The desire was to produce a sample response consisting of 0.3%, or 240 officers. Recognizing the pyramid rank structure which exists in the Army, it was assumed that a dominance of the sample would reflect the O-1 to O-4 paygrades. Further tailoring of the desired sample was conditioned by the heuristic of needing at least 20 responses in

any pertinent demographic variables to be measured, specifically the 0-6 and above and finance officers.

The majority of the sample was obtained through direct mail to officers selected from the Fort Ord computer printout. In addition, questionnaires were mailed to the Finance School at Fort Benjamin Harrison, and others were personally delivered to Headquarters Department of the Army (HQDA), Washington, D.C.

Since the survey was mailed and no direct administration or instructions could be given to the recipients, a cover letter was provided. The purpose of the transmittal letter was to provide an explanation to the recipient as to the purpose of the questionnaire and instructions for its completion. As in the construction of the questionnaire itself, specific attempts were made to avoid the potential for biasing responses. The explanation of the questionnaire was limited to a discussion of decision-making without specifically addressing the risk aspect because of the potential for biasing. Additionally, the respondents were assured of their anonymity and informed that there were no right or wrong answers. The questionnaire transmittal letter is provided in Appendix A.

It was desired to achieve a selection process from the computer printout that would approximate randomness while limiting those selected to a total number. Based on the specific population in each paygrade contained in the computer printout, the specific mailing desired from the list was 100 questionnaires each to the 0-1, 0-2, and 0-3 paygrades, 80 surveys each to the 0-4 and 0-5 paygrades, and 40 to the 0-6 paygrade. Once these figures were arrived at, the exact selection procedure for any paygrade was quota sampling which typically consisted of selecting every third

officer listed. While not precisely random, this approach approximates randomness and provided a sample which was generally representative of the mix of officers in the army.

In general, it was expected that the average return rate would be 50%. However, it was determined that even if this rate were not achieved, that a much more conservative return rate of 30% would still provide enough data for meaningful evaluation. The actual responses exceeded the expected return rate and the total sample consisted of 297 responses as depicted in the following table:

TABLE I

Response Table

Distribution Technique	Fielded	Returned	Percent
Fort Ord Mail	470	282	60%
Pentagon Personal Delivery	25	15	60%
Fort Ben Harrison Mail	40	0	0
Totals	535	297	56%

The 40 surveys mailed to Ft. Benjamin Harrison finance school did not produce a single response as of the cutoff time for this study. Attempts to follow-up on this lack of response from the finance school indicated that approximately 25 responses were returned, but apparently delayed by the mail system. The response rate to any single question may not equal the 297 responses possible since some of the questionnaires had some individual question responses omitted. A more detailed breakdown of the sample characteristics is available in the Results chapter.

B. THE SURVEY INSTRUMENT

After reviewing the existing risk preference questionnaires, it was decided that none would totally satisfy the specific research interests of

this study. The prime deficiency was viewed as a lack of situational authenticity when used in the military environment. This deficiency obviously exists due to the different objectives of the questionnaires. It was felt that an assessment of a military officer's preference for risk in a gambling situation would not easily translate into meaningful inferences about the officer's preference for risk in a job related setting. This belief is substantiated by earlier research which demonstrated that an individual's preference for risk may be situationally determined [Ref. 13]

As a result, it was necessary to develop a new questionnaire which incorporated the situational constraints germane to this research effort. This instrument incorporated some of the features contained in the Tversky and Kahneman questionnaire [Ref. 10] as well as Kogan and Wallach's choice dilemma questionnaire [Ref. 17]. It was believed that using these existing questionnaires as a model would enhance the validity as well as assist in the preparation of the instrument. Another consideration was to include questions which would be meaningful across the broad scale of paygrades (0-1 to 0-8) which comprised the sample. As such, the situations included some decisions which were normally the province of junior officers, some the province of midgrade officers, and still others the province of senior officers. In all cases, attempts were made to provide situations general enough for the respondent to have some appreciation for the setting of the decision.

The specific parameters of the survey can be grouped into four major areas of demographic questions, combat questions, finance questions, and career questions.

1. Demographics

The first section of demographics included sixteen questions concerning variables of interest to this research effort. These included:

a. Rank

This variable was considered important since rank is a strong indice of success in the military. Additionally, the basic hypothesis that military officers may vary their preference for risk based on their rank could be analyzed with the inclusion of this variable.

b. Sex

This variable was of interest to determine if any significant variance existed between male and female officers' preference for risk on the questions.

c. Marital Status

This variable was of interest to determine if bachelor officers were more or less risk aggressive than married officers who may perceive greater loss associated with choosing riskier alternatives.

d. Education Level

Subjects were asked to indicate their highest education level completed. Although not directly related to our central hypothesis, this variable was included because of potential interest in explaining variances in results.

e. Basic Specialty

Subjects were asked to provide their basic military specialty by indicating this in the available space. It was expected that some of the variance in risk preference demonstrated in the decision frames would be explainable by the differences in military specialty or branch.

f. Combat Experience

Subjects were asked to indicate if they had ever served in a combat zone. It was felt that this may be a significant variable in analyzing the risk preference in combat situations.

g. Years of Active Duty Service

Subjects were asked to indicate their accumulated years of active duty service. This variable was included to see if military experience was a factor in an officer's preference for risk.

h. Career Intentions

Subjects were asked to indicate the number of years of service they planned to have when they retire. This variable was included to determine if respondents who intended to make the military a career differed in their preference for risk from officers who planned to get out of the service at an earlier point.

i. Current Age

Subjects were asked to indicate their age in years. Similar to rank and years of service, this variable was included to see if age was correlated with an officer's preference for risk.

j. Early Promotion

Subjects were asked to indicate whether they had ever been selected for early promotion. This was a key indicator of a successful decision maker. Officers who have been selected early have been identified by the promotion system as having been clearly outstanding and in the top 5% of their peers. It is commonly recognized that secondary zone promotion is probably more indicative of greater potential for career success than any other attribute an officer may have in his record. This is a key

variable in looking for potential differences in the manner in which military officers handle risk in decision making.

k. Advanced Military Schooling

In these two separate questions, subjects were asked to indicate whether they had ever been selected to attend the Command and General Staff College (C&GSC) or any of the War Colleges. Both of these institutions are considered vital "tickets" in a successful military officer's career. Attendance at the C&GSC is generally accepted as necessary if an officer wants to make 0-5. Selection for the War College is seen as a clear indicator that an officer has potential for the 0-6 and above paygrades. Similar to early promotion, these variables will be measured as success criterion in comparing an officer's preference for risk.

l. Actual Officer Efficiency Reports (OER)

Respondents were asked to indicate how they would characterize their OER scores as compared to their peers by indicating either the top third, middle third, or lower third. This variable was also included as a measure of success. Clearly those officers who characterized their OER's as other than the top third would have difficulty achieving 0-6 and above.

m. Performance

The subjects were asked to indicate how they felt their actual performance compared to their peers' performance by marking top third, middle third, or lower third. This variable was included to contrast with an officer's actual OER beliefs. It was felt that certain officers may be institutionally successful as indicated by high OER's, but characterize

their own performance as significantly different. Additionally, actual performance rather than OER scores may be a more significant measure of potential success.

n. Commission Source

Respondents were asked to indicate their source of commission by marking either Academy, ROTC, or other. This variable was included to determine if any significant differences among the four sources of officers and their preferences for risk would be evident.

2. Combat Questions

The second major section of the survey is the five questions constituting the combat decision frame. These questions were designed to measure an officer's preference for risk by confronting the respondent with a combat situation followed by two choices. One choice was determined to be risk aggressive with the other choice characterized as being risk averse. It was decided to use a series of five questions for a variety of reasons. Since this instrument had never been utilized before, it was felt that a mix of questions within each decision frame would provide more valid results than a single question. This would hopefully enable the assessment of the degree and consistency of risk aggression producing a risk profile. This variety of combat questions was also attractive in that it allowed a much richer combination of situations which could be depicted by the questions. The ability of the military officer to identify with and have some empathy for the situations provided by this instrument was a key concern in the survey design. For each question, the determination of the relative risk associated with the respective alternatives was

supported by the pretest and posttest comments and interviews. A brief discussion of each combat question follows:

a. Combat Question 1

In question one, the situation depicted a Company Commander expecting an enemy attack likely to kill 100 of his men. The subjects were then provided two alternatives with equal expected values. Alternative (A) will ensure that 25 out of the expected 100 will be saved. In contrast, alternative (B) suggests a 25% chance that all 100 will be saved, but a 3/4 probability that none of the 100 will be saved.

In this situation the expected values are equal and the choice is between the sure bet of saving 25, thereby losing 75 men, or the riskier alternative of possibly saving everyone (25% chance) with a high probability of not saving anyone (75% chance).

b. Combat Question 2

In question two, the situation involved a Company Commander tasked with achieving an objective held by an inferior enemy force. The subject is afforded two plans of equal expected value to accomplish the mission. Plan (A) will accomplish the mission, but would result in the loss of 5 men. Plan (B) would also accomplish the mission but has a 50% chance of losing 10 men if detected early but no losses if undetected. In this situation the expected values are also the same. The dilemma is between the sure loss of only 5 men offered in (A) or the possibility of no losses with the potential for the loss of 10 men in (B). The design hypothesis asserted that plan (A) was risk averse while plan (B) was risk aggressive.

c. Combat Question 3

In question three, the situation from question two is altered by the information that the enemy forces had been underestimated. As a result, the plan (A) will now yield 140 casualties and plan (B) will either yield 280 casualties (50% chance) or no losses. Each plan has the same expected value, therefore the choice dilemma is essentially the same as in question two. However, the scale of the losses in question three is significantly greater than in two in order to determine if the magnitude of the potential losses would alter the decision. The design hypothesis called for plan (A) to be risk averse and plan (B) to be risk aggressive.

d. Combat Question 4

In question four, the situation portrayed a Division Commander with 9000 soldiers faced with selecting an attack scenario. The staff has provided two alternatives of equal expected value. In alternative (A), all the resources are committed with no reserves. There is a high probability of success (90%), but failure has a high premium as 6000 soldiers are lost. In alternative (B), a significant portion of the forces are held in reserve to react to unanticipated developments. This plan has a 60% chance of success with failure resulting in the loss of 1500 soldiers. The choice dilemma is whether to opt for the sure loss of only 1500 soldiers using the accepted convention of maintaining a reserve force or choose plan (A) which increases the chance of success but includes the potential disastrous loss of 6000 soldiers. The design hypothesis characterized plan (B) as risk averse and plan (A) as risk aggressive.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

e. Combat Question 5

Question five of the combat questions asks the responding officer to imagine himself as a Company Commander pinned down by enemy fire. The two alternatives, one being a conventional attack and the other being to call in an air strike on essentially his own position, have the same expected value of losses.

The conventional attack results in a sure loss of 40 lives and the air strike has a 40% chance of 100 lives being lost; the airstrike is therefore the more risk aggressive between the two choices since the outcome is uncertain.

3. Financial Questions

The third segment of the survey is comprised of five questions depicting situations where a military officer is confronted with decisions characterized by financial considerations. Again the variety of questions was included to reduce the chance bias that may result from a single question and also assist in assessing the degree and consistency of the risk preference of the respondents. A further concern was to identify financial questions which would be meaningful to the typical military manager who has limited precise knowledge of finance but necessarily makes important decisions on the allocation of scarce resources. A brief discussion of the five financial questions follows:

a. Finance Question 1

Question six, the first of the financial questions, places the respondent in the position of envisioning himself as a budget officer for a military post. As such he is given the choice between forwarding a budget intact, or inflating the budget estimates to hedge against

potential cuts. The situation describes the inflated budget as less believable than the non-inflated estimate. As a result, the respondent is categorized as risk aggressive if he chooses the inflated budget since the non-inflated budget is easier to defend.

b. Finance Question 2

The seventh question of the survey situates the respondent as a transportation officer with an excess deadline inventory which he is receiving "heat" about. Deadline inventory refers to vehicles which cannot be used because they are awaiting some form of maintenance or parts. The options provided are to either use the supply system, which would take a considerable length of time, or to "cannibalize" some of the deadlined vehicles to fix others, which "is expected to result in a higher breakdown rate which will cost more in the long run." Since the second option will cost more, and because of the negative connotation normally associated with "cannibalizing", it is considered the more risk aggressive option.

c. Finance Question 3

Question eight of the survey places the respondent in the position of needing to dispose of a $250,000 contingency fund out of a $5 million budget. The choices presented the respondent are to turn the money back in, which results in a 10% reduction in next year's budget, or to spend the money on a questionable expense. If the 20% chance of detecting the expenditure were to come to fruition, the respondent is told that his budget would be reduced by $125,000 for the next year. Similar to the combat questions, taking the sure loss over the chance of a loss is considered the more risk averse approach.

d. Finance Question 4

Question nine asks the respondent to envision himself as a Financial Officer forced to make a decision of whether or not to reduce an existing, but here-to-fore largely unused, contingency fund. In the question it is stated that "policy guidelines recommend a 6% contingency fund against unforeseen developments," but it also states later that unused contingency funds can never be spent efficiently. Four alternatives were provided in addition to the alternative of maintaining the current contingency fund level. These five choices were provided because pretest showed some willingness to deviate from policy, however the degree to which respondents were willing to deviate varied significantly. For the purpose of measuring risk preference, it was determined that any of the four alternatives that reduce the contingency below the policy guidelines would be considered risk aggressive.

e. Finance Question 5

In question ten, the last of the financial questions, the respondent is asked to choose an expenditure plan as the Financial Officer for a post. Three choices are provided; obligate the bulk of the budget early in the relevant period, obligate the budget funds consistently throughout the relevant period, or obligate the bulk of the budget funds late in the period. Since no further discussion is provided concerning the relative pros and cons of each expenditure plan, it is assumed that a respondent would select an alternative based on his preference for risk. The alternative of obligating early in the period carries a more risk aggressive connotation than the other two alternatives and it was evaluated as such.

4. Career Questions

The last segment included in the survey can be best described as questions concerned with an officer's career. In these five questions, a number of situations are described which subject the respondent to a choice dilemma. The alternatives provided can be identified as either directly career enhancing or personally attractive. It was determined that the officer who would select the personally attractive choice over the career attractive choice was more risk aggressive in the career sense. Again, while the dependent variable "career" was evident in all five situations, each question varied in its context. A brief discussion of each of the five career questions follows:

a. Career Question 1

Question eleven of the survey depicts a situation where an officer is discussing placement possibilities with an assignment officer. There are two choices offered by the assignment officer with contrasting characteristics. Assignment choice (A) is characterized as "career enhancing" and professionally demanding, but is not personally appealing. Assignment choice (B) is personally appealing but is not considered as professionally demanding as choice (A).

The assessment of risk associated with each choice was based on the assumption that the more professionally demanding the job, the better it will reflect on an officer's career. Using this criterion, the design hypothesis characterized option (A) as risk averse and option (B) as risk aggressive.

b. Career Question 2

Question twelve depicts a situation where a junior officer (O-3) has made a recommendation on an important issue to his boss (an O-5). The boss disagrees with the recommendation and despite further discussion is going to forward his conclusions up the chain withholding the junior officer's recommendations. The junior officer is faced with two choices: alternative (A) is for the officer to say nothing more,and it is implied that his boss will give him a positive OER. Alternative (B) suggests the junior officer find a way to get the information around the boss. There is a 50/50 chance this might embarrass the boss and thereby negatively impact on his OER. The assignment of risk to these alternatives is based on the assumption that circumventing your boss is a risky proposition and the chance that it will impact negatively on your OER is putting your career in risk. Therefore, the design hypothesis assessed alternative (A) as risk averse and alternative (B) as risk aggressive.

c. Career Question 3

In question thirteen, the situation depicted an O-4 who is deciding on alternative methods of getting a graduate education. Option (A) would mean that the officer would go to a job in his specialty keeping him in the "mainstream" and pursue a graduate degree on his own time after normal duty hours. Option (B) means the officer will attend a fully funded graduate program at a civilian institution. This would take the officer out of the "mainstream" for the period of his education. The assessment of risk in this situation is based on the assumption that the expected outcome, a graduate degree, is equal in each case. However, the officer who pursues the degree by attending the civilian school foregoes

a year or more of military experience and may be less competitive than officers who get their degrees on their own time. The design hypothesis assessed alternative (A) as risk averse and alternative (B) as risk aggressive.

d. Career Question 4

Question fourteen of the survey asks the respondent to envision himself as a division staff officer responsible for originating correspondence to the Department of the Army and other major headquarters. In that position, he is asked which is more important: format, content, or whether they are of equal importance. It was assumed that the officer who states that the content is the most important is the more risk aggressive. As supported during post survey interviews, this respondent envisions his "message" as being most important, while other respondents believed that their message will not be received unless the rules of the system are followed. Paraphrasing one respondent's comments, "it is unfortunate but oftentimes the content will not be accepted unless it is formated properly."

e. Career Question 5

Question fifteen, the last of the career questions, depicts a situation where an O-4 is working for an O-6 who spends normal work hours in casual conversations and then catches up on his work late in the evenings or on weekends. The officer is once more faced with two alternatives. In alternative (A) the risk aggressive officer gets his work done and leaves on the normal work schedule. In alternative (B), the risk averse option, the officer would spread out his workload to more closely match his boss's schedule. The risk assessment is based on the assumption that the officer

who works the longer hours with his boss believes he will incurr less career risk than the officer who works at his own pace regardless of the boss's norms.

C. SURVEY PRETESTS

Although this survey has some conceptual linkage to earlier risk preference questionnaires such as Tversky & Kahneman's, the development of the military situations depicted was unique. As a result, the survey was pretested at the Naval Postgraduate School, Monterey, California, prior to administration. This pretest was administered to thirty Army Officers from paygrade 0-3 to 0-5. Comments on situation reality as well as identification of the risk aggressive alternative were solicited. The pretest comments resulted in the alteration of several questions and the changing of the format of some of the questions. In addition, the comments as well as posttest interviews assisted in formulating the design allocation of whether an alternative was risk aggressive or risk averse.

D. ANALYTICAL TECHNIQUES

After the responses were received, they were sorted by rank to ease compilation of data and determine if a reasonable distribution of responses was included. In order to convert the survey responses to nominal level data, it was necessary to recode each response. For example, in the demographic section, marital status was recoded to nominal data by converting married responses to 1 and single responses to 2. Similarly, in the survey questions the responses were converted to nominal data by assigning the value 1 to risk-averse replies and 2 to risk-aggressive responses. Survey questions in which responses were omitted were assigned a zero (0) as a missing value.

The compiled data were manually entered into a prepackaged computer program (Statistical Package for Social Sciences - SPSS) for analysis. [Ref. 28] This robust statistical program is widely accepted and used for behavioral research. It affords the researcher a wide variety of statistical evaluations which are easily obtained through routine manipulation of the program. Another key feature of the SPSS program is the convenience and quality of the output displays through a variety of graphs and charts.

A number of analytical techniques were used to examine the interaction and significance of the variables considered in the survey. These primarily included, but were not limited to, frequency analysis, cross-sectional analysis, comparison of the means and associated variances, and some non-parametric correlation analysis. A chi-square and t-test were used to establish if the results of the analysis were statistically significant.

The frequency analysis provides a general overview of how the sample responded to the questionnaire and thus serves as a guide to which variables appear to provide meaningful results.

Based on these results, a cross-sectional analysis is used to break down the demographic variables into subsets considered relevant. These subsets are compared against the survey questions to determine if significant relationships exist. Analyzing the variable rank as an independent variable provides insight into how each of the subgroups 0-1 to 0-6 answered each individual question. The primary focus is on the distribution of the responses to determine if any unique relationships exist.

An analysis of the means and variances associated with each demographic variable in its subgroups is accomplished by using a breakdown analysis. This analysis provides an easy method for comparing the relative differences between the manner in which the demographic variables answered the questions. For example, the mean response of 0-1's to the combat question can be compared to the mean response of the 0-6's. Analysis of the variances associated with these means is used to establish whether the responses were tightly grouped together or varied between the risk averse and risk aggressive response. Finally, a non-parametric correlation analysis is utilized to determine if any of the demographic variables considered significantly explain the variation in response to the decision frame examined.

These analytical techniques coupled with the tests of statistical significance are used to narrow the focus of the research to those variables which contribute to a greater understanding of the research effort.

IV. RESULTS OF ANALYSIS

The organizing method utilized to analyze the results of the survey was governed by two needs or concerns. First, the underlying distribution of the data was largely nominal and ordinal level data which restricted the use of some of the more conventional statistical techniques such as parametric measures of regression. Despite this limitation, the dichotomous nature of the data allowed an assumption of interval level measures such as means, if applied prudently. The second concern was to transfer and package the data through the use of various statistical methods to a meaningful level of understanding. This transformation primarily relied on four statistical techniques with each transformation increasing the confidence about any conclusions drawn from the survey responses.

Since each decision question was not going to be individually analyzed, the responses were grouped into the four composite indexes of interest: combat, finance, career, and the overall survey. In order to ensure that these groupings were reasonable, a review of the relative rankings of the means for each paygrade was conducted for each question and each composite grouping. The review demonstrated the positions remained relatively consistent throughout the questions of each composite group.

A frequencies analysis was done to discern the gross distribution of the sample data throughout the variables. Based on these results, a cross-tabs procedure was utilized to analyze how specific subgroups of the variables responded to the decision groupings. Additionally, this procedure provided a chi-square test of significance which assisted in the initial

selection of variables that warranted further investigation. Using this procedure as a guide, a second statistical test of significance was applied by using either a T-test, or where appropriate, a Kendall's correlation test of significance. Although these techniques constituted the most important analytical procedures, a number of ancillary procedures were also considered. These included additional investigations with the students' T-test of the statistical significance of the difference between the means, a one-way analysis of variance (ANOVA), and some limited regression techniques.

The first method of displaying the returned survey data is the frequency distributions tables generated by the SPSS program. These tables give a basic understanding of the relative response rate for each of the demographic and survey questions and therefore provide the first insights into the meaning of the data. The demographic data are examined first and this is followed by the survey responses frequencies. In the survey where individual responses were omitted, the totals do not equal the total number of respondents to the survey and the frequencies do not total 100%.

A. DEMOGRAPHIC DATA OF SURVEY RESPONDENTS

The demographic frequencies are presented in the same order as in the survey questionnaire. However, the sixteen original questions from the survey have been reduced to the seven believed to be the most interesting to examine and the remainder have been placed in Appendix B along with the actual questionnaire response frequencies. The seven include rank, education level, basic specialty, combat experience, expected number of years of service at retirement, early promotion selection, and source of

commission. The demographics that have been moved to the appendix were not considered central to the studies hypothesis, such as marital status, but were included in the original study as possible alternative sources for explanations of any variances or trends found in risk preference. These demographics that do later provide explanations for some of the variance or trends are discussed in the sections relating to the relevant statistical analysis that was conducted.

1. Rank of Respondent

TABLE II

Rank of Respondent/Frequency of Response

Paygrade	Respondents	Army Population
0-1	53 (17.8%)	(10.8%)
0-2	58 (19.5%)	(15.3%)
0-3	68 (22.9%)	(37.1%)
0-4	59 (19.9%)	(18.4%)
0-5	32 (10.8%)	(12.6%)
0-6	27 (9.1%)	(5.8%)
total	292	CHI-SQUARE= 38.541 significance= 0.000

The relative frequencies by rank for the Army population were included for a comparison against the survey responses. The comparison of these frequencies reveals a chi-square that is considered significant at the 0.05 level. Thus, the sample is not strictly representative of the overall Army rank distribution. 0-1's and 0-6's and above were overrepresented. Despite these apparent differences, grouping these respondents into the three categories of junior officers (0-1, 0-2, and 0-3), field grade officers (0-4, and 0-5), and senior officers (0-6 and above), creates a chi-square of 0.17 indicating a closer approximation to the Army population.

2. Education Level of Respondent

TABLE III

Education Level of Respondent/Frequency of Response

Education	Survey
2 yr college	7 (2.4%)
4 yr college	183 (61.6%)
advanced degree	106 (35.7%)

The high proportion of advanced degree (36%) was not expected and indicates either that a large percentage of the persons receiving the questionnaire possessed advanced degrees, or that perhaps advanced degree holders provided a higher response rate due to some empathy towards academic research efforts. Due to the limited number of respondents with only a 2 year college degree, their responses will be excluded in any further analysis that compares the levels of education.

3. Basic Specialty of Respondent

A broad cross-section of all of the officer basic specialties was received, indicating that the sample may be generally representative of the Army. Despite this broad representation, the specific frequencies of response of some of the basic specialties was considered inadequate to conduct meaningful analysis against. To accommodate the low response rate, it was convenient to reclassify the basic specialties into the headings of line, staff, and service support. The line category combines the responses from infantry, armor, artillery, air defense, and the engineers; the staff category combines the signal corps, military police, military intelligence, ordinance, the chemical corps, aviation, and administration; and the service support category contains the rest.

TABLE IV

Basic Specialty/Frequency of Response

Category Label	Respondents
INFANTRY	73 (24.6%)
ARMOR	9 (3.0%)
ARTILLERY	46 (15.5%)
AIR DEFENSE	12 (4.0%)
ENGINEERS	12 (4.0%)
SIGNAL	19 (6.4%)
QUARTERMASTER	6 (2.0%)
TRANSPORTATION	14 (4.7%)
MILITARY POLICE	9 (3.0%)
FINANCE	9 (3.0%)
MILITARY INTELLIGENCE	29 (9.8%)
CHAPLIN	2 (0.7%)
JUDGE ADVOCATE GENERAL	1 (0.3%)
ORDINANCE	2 (0.7%)
CHEMICAL	4 (1.3%)
AVIATION	13 (4.4%)
MEDICAL CORPS	7 (2.4%)
MEDICAL SERVICE CORPS	8 (2.7%)
ARMY NURSE CORPS	2 (0.7%)
ADMINISTRATION	16 (5.4%)
MISSING VALUES	4 (1.3%)
TOTAL	297 (100.0%)

TABLE V

Grouped Basic Specialty/Frequency of Response

Category Label	Respondents
line	152 (51.2%)
staff	92 (31.0%)
service support	53 (17.8%)

The responses in these combined categories indicate the largest response population to be the line community.

4. Respondents with Combat Experience

It is interesting to note that a substantial proportion (39%) of the respondents have had combat experience, thereby increasing the confidence in any results demonstrating this variable as significant.

TABLE VI

Combat Experience/Frequency of Response

Category	Respondents
yes	114 (39.0%)
no	178 (61.0%)

5. Respondents Expected Length of Service at Retirement

TABLE VII

Expected Retirement/Frequency of Response

Category	Respondents
< 20	165 (58.7%)
> 20	116 (41.3%)

The retirement variable was grouped into officers who planned to retire with less than or equal to 20 years of active duty service and those who planned to retire with greater than 20 years of service. The 20 year break point was selected because of the expected interest in the results grouped in this manner, as well as the second category including all of the officers planning to exceed the minimum career standard.

6. Early Promotion Selection

TABLE VIII

Early Promotion/Frequency of Response

Category	Respondents
yes	36 (12.1%)
no	260 (87.5%)

The percentage of respondents (12%) that have been selected for early promotion appears to be reflective of the Army's current stated rate of 10%.

7. Source of Commission

See Table IX. The category of "other" was primarily direct commissions for basic specialties such as doctors and layers.

TABLE IX

Commission Source/Frequency of Response

Source	Respondents
Academy	53 (17.8%)
ROTC	167 (56.2%)
OCS	56 (18.9%)
others	21 (7.1%)

B. FREQUENCIES OF RESPONSES FOR EACH QUESTION

The survey questionnaire responses are accumulated by risk averse or risk aggressive with the response frequency displayed next to each question number. This display provides the reader with a convenient method of comparing relative response rates to each of the questions in one place.

From the survey questionnaire frequencies table, it is interesting to note that there are several questions where the response rate highly favors either the averse or the aggressive response. In the combat questions for example, the responses are fairly balanced with the exception of question two which is heavily aggressive. In the financial questions, the responses favor the averse response with the exception of question 9. In the career decision frame, the responses to question 12 and 14 appear to contrast with the generally aggressive response mode for the overall decision frame. A sensitivity analysis was done to determine if these questions detract or bias the analysis. The results of the sensitivity analysis are discussed in each relevant decision frame. Across the entire survey, question fifteen displayed the largest proportional difference in response preference with only 11.4% of the respondents favoring the averse response. See Table X.

TABLE X

Survey Questionnaire/Frequency of Response

Question	Averse	Aggressive
cbt1	115 (38.7%)	180 (60.6%)
cbt2	49 (16.4%)	247 (83.2%)
cbt3	148 (49.8%)	148 (49.8%)
cbt4	143 (48.1%)	151 (50.8%)
cbt5	167 (56.2%)	128 (43.1%)
cbt	621 (42.1%)	854 (57.9%)
fin6	253 (85.2%)	44 (14.8%)
fin7	225 (76.0%)	72 (24.0%)
fin8	246 (82.8%)	51 (17.2%)
fin9	83 (27.9%)	213 (71.7%)
fin 10	217 (73.1%)	79 (26.6%)
fin	1024 (69.0%)	459 (31.0%
car11	94 (31.6%)	201 (67.7%)
car12	231 (77.8%)	63 (21.2%)
car13	86 (29.0%)	211 (71.0%)
car14	195 (65.7%)	102 (34.3%)
car15	34 (11.4%)	257 (87.9%)
car	640 (43.3%)	838 (56.7%)
survey	2285 (51.5%	2151 (48.5%)

C. SIGNIFICANCE TESTS

Given the general trends and obvious findings evident from the frequencies analysis, it was necessary to use more powerful statistical techniques to understand how the demographic variables affected the responses to the questionnaire. The initial step in this direction was to use a combination of statistical significance tests to determine if the data examined for results are meaningful.

Because of the underlying nature of the data (nominal, ordinal, and some interval), three primary significance level tests were used. A chi-square test of statistical significance was used to initially screen out variables which would not provide meaningful results by analyzing the

significance of the frequency distribution of the results. The Kendall's nonparametric correlations test was used to augment the chi-square test and was useful in identifying the demographic variables which most highly correlated with the decision frame questions. It was recognized that this test would be most meaningful for variables with three or greater number of subgroups. The final test of the significance of the results was accomplished by using the students' T-test procedure for investigating the difference between the noted effects.

In light of the basic research hypothesis, and given the general rather than specific conclusions desired, an arbitrary level of significance of 0.20 was established as appropriate for the initial chi-square screening. Since the nature of this research effort was exploratory and original, rather than confirmatory, this liberal significance level was adopted to include the initial consideration of as many variables as possible which might impact on an officer's preference for risk. It was determined that the more traditional, although arbitrary, level of 0.05 would have eliminated variables which otherwise provided interesting results. Despite this rather liberal level of significance, a second test of significance using either a Kendall's correlation test of significance or a T-test, as appropriate was applied to each variable considered. Any variable which was not significant at the 0.10 level for these tests was not considered in any further analysis.

Using these tests as a guide, a statistical significance matrix was developed by comparing the demographic variables with the grouped responses to the decision frames of combat, financial, and career, as well as the variable survey which grouped all of the responses. The matrix shows that

the variables rank, combat experience, early promotion, war college selection, source of commission, education level, and planned years of service at retirement were all significant in most of the relevant decision frames. In addition, a number of other variables such as service experience, sex of respondent, and marital status were also significant in several of the decision frames.

TABLE XI

Significance Levels of Statistical Tests

VARIABLE	CBT	FIN	CAR	SURVEY	
rank	.000	.054	.250	.200	chi-square
	.002	.001	.181	.004	Kendall
sex	.042	.725	.456	.188	chi-square
	.000	.387	.323	.012	T-test
marital	.057	.478	.106	.551	chi-square
status	.033	.190	.570	.111	T-test
education	.506	.048	.516	.418	chi-square
level	.511	.001	.499	.004	Kendall
basic	.176	.653	.516	.206	chi-square
specialty	.064	.743	.340	.020	Kendall
combat	.143	.150	.196	.410	chi-square
experience	.074	.033	.179	.118	T-test
service	.065	.134	.160	.453	chi-square
experience	.030	.013	.490	.024	T-test
retirement	.013	.811	.066	.674	chi-square
plans	.130	.814	.268	.367	T-test
age	.007	.162	.033	.179	chi-square
	.023	.011	.295	.046	Kendall
early	.043	.005	.315	.086	chi-square
promotion	.026	.009	.141	.028	T-test
CGSC	.002	.049	.384	.181	chi-square
	.004	.011	.399	.006	T-test

War	.000	.000	.025	.000	chi-square
College	.000	.001	.175	.000	T-test
peer	.000	.875	.730	.001	chi-square
OER	.342	.512	.058	.725	T-test
actual	.950	.981	.432	.946	chi-square
OER	.676	.605	.254	.306	T-test
expected	.009	.902	.402	.124	chi-square
rank	.005	.569	.105	.696	T-test
commission	.027	.262	.060	.488	chi-square
source	.002	.398	.285	.005	Kendall

D. STATISTICAL METHOD

The primary methodology for analyzing the data involved a cross-sectional analysis of the decision frame questions by the relevant demographic variables. This was accomplished by essentially relying on two SPSS statistical procedures, CROSSTABS Analysis and BREAKDOWN Analysis.

The crosstabs analysis is the most appropriate for nominal and ordinal level data. It allows an investigation of the sets of relationships among two or more of the variables by computing a contingency table (crosstabulation) of the frequency distribution of the cases by the variables considered. The display of the joint frequency distribution provides a greater measure of how the variables interacted than a simple frequency analysis.

The breakdown procedure is used to investigate the central tendencies of the variables measured. It provides a simple technique for examining the means and variances of our primary criterion (decision frames) broken down by the relevant demographic variables. This procedure relies on the assumption that the dichotomous nature of our data makes it reasonable to calculate the means as a useful measure of central tendency. The

comparison of the means enables a gross consideration of the relative level of risk aversion or aggressiveness exhibited by the subgroupings. [Ref. 28]

The results are organized by examining the three decision frames as discrete entities and summarizing the findings by the demographic variables which provided meaningful results based on the tests for statistical significance. In addition, in order to examine any general tendencies, a composite variable labeled as "survey," representing the sum of all of three decision frames was analyzed for significant results. If the theory of response preference variations based on decision frames holds some merit, combining these three decision frames into a single composite is not necessarily logical. However, without experience or proof that the composite of this questionnaire lacks credibility as an analytical approach, this combination has been pursued as part of the overall effort to determine an officer's risk profile.

E. ANALYSIS OF COMBAT VARIABLE

The variable combat can be defined as the sum of the responses, using the value 1 as averse and 2 as aggressive, of the 5 combat questions for each of the respondents. Based on the variations displayed in the frequencies section, in order to see if the 5 question decision frame was reasonable, a sensitivity analysis was accomplished based on excluding combat question 2. This analysis demonstrated that eliminating this question from consideration marginally altered the chi-square significance levels of the newly modified combat variable. For example, the chi-square significance levels for the variable marital status changed from 0.057 to 0.063 and the chi-square for service experience improved marginally from

0.065 to 0.058. Despite these small changes, using the acceptance levels established for this research effort, no variables were added or deleted when question 2 was removed from consideration. As further support of the decision to not remove combat question 2 from the combat decision frame, the sensitivity analysis of the means of the demographic subgroup responses, showed the results would not be substantially altered. The cross-sectional analysis of the variable combat, broken down by all the demographic variables, shows that twelve variables provide statistically significant results. The following findings are noted:

1. Rank of Respondent/Combat

Crosstab analysis of the frequency distribution of the rank variable in this decision frame showed that a large percentage of all responses were grouped in the middle cells with the exception of the 0-6 and above subgroup which was decidedly shifted towards the risk aggressive extreme. In general, the table shows that 0-1's answered more frequently risk averse and 0-6 and above answered more risk aggressive than any of the other ranks. This is supported by comparing the mean responses for each paygrade provided by the breakdown procedure. The grand mean of 1.5774 for the combat variable was greater than the middle response of 1.5 demonstrating a slight preference for the more risk aggressive answers. Further analysis of the means demonstrated a general trend from 0-1 to 0-6 for increasing risk aggressive responses. The mean responses have been added to the Crosstab table for ease of review. The chi-square test of significance for the rank variable in this decision frame is 0.000 and the Kendall's correlation test of significance is 0.002.

TABLE XII

Crosstabs Table of Rank vs Combat

COUNT ROW PCT COL PCT TOT PCT	RANK						ROW TOTAL
	0-1	0-2	0-3	0-4	0-5	0-6	
0*	2 40.0 3.9 0.7	1 20.0 1.7 0.3	0 0.0 0.0 0.0	1 20.0 1.8 0.3	0 0.0 0.0 0.0	1 20.0 3.7 0.3	5 1.7
1	9 23.7 17.6 3.1	6 15.8 10.3 2.1	10 26.3 14.9 3.4	7 18.4 12.3 2.4	6 15.8 18.8 2.1	0 0.0 0.0 0.0	38 13.0
2	10 14.3 19.6 3.4	19 27.1 32.8 6.5	18 25.7 26.9 6.2	12 17.1 21.1 4.1	7 10.0 21.9 2.4	4 5.7 14.8 1.4	70 24.0
3	20 25.0 39.2 6.8	10 12.5 17.2 3.4	20 25.0 29.9 6.8	20 25.0 35.1 6.8	7 8.8 21.9 2.4	3 3.8 11.1 1.0	80 27.4
4	8 11.4 15.7 2.7	18 25.7 31.0 6.2	14 20.0 20.9 4.8	14 20.0 24.6 4.8	10 14.3 31.3 3.4	6 8.6 22.2 2.1	70 24.0
5	2 6.9 3.9 0.7	4 13.8 6.9 1.4	5 17.2 7.5 1.7	3 10.3 5.3 1.0	2 6. 6.3 0.7	13 44.8 48.1 4.5	29 9.9
COLUMN TOTAL MEAN	51 17.5 1.514	58 19.9 1.572	67 22.9 1.558	57 19.5 1.567	32 11.0 1.569	27 9.2 1.785	292 100.0 1.577

2. Sex of Respondent/Combat

The cross-sectional analysis of this decision frame broken down by the variable sex shows that male officers answer more frequently risk aggressive than female officers. This frequency distribution was supported by breakdown analysis of the means. The standard deviation of the female population for this decision frame was only 0.17 indicating a smaller

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*For all crosstabs tables the left-hand column count is the sum of the total aggressive responses.

variance in their responses in comparison with the male responses which had a standard deviation of 0.25. Since the sample did not include any female officers above the rank of 0-4, a sensitivity analysis was done eliminating the male officers above that rank. The results were consistent, although not as dramatic as the initial findings. The chi-square test of significance for this variable is 0.042 and the subsequent T-test level of significance is 0.000.

TABLE XIII

Crosstabs Table of Respondents' Sex vs Combat

CBT	COUNT ROW PCT COL PCT TOT PCT	MALE 1.	FEMALE 2.	ROW TOTAL
	0	5 100.0 1.8 1.7	0 0.0 0.0 0.0	5 1.7
	1	33 86.8 12.2 11.3	5 13.2 23.8 1.7	38 13.0
	2	61 87.1 22.5 20.9	9 12.9 42.9 3.1	70 24.0
	3	74 92.5 27.3 25.3	6 7.5 28.6 2.1	80 27.4
	4	69 98.6 25.5 23.6	1 1.4 4.8 0.3	70 24.0
	5	29 100.0 10.7 9.9	0 0.0 0.0 0.0	29 9.9
	COLUMN TOTAL	271 92.8	21 7.2	292 100.0
	MEAN	1.589	1.429	1.577

3. Marital Status/Combat

The cross-sectional analysis of the marital status variable in the combat decision frame showed that married officers selected the more risk aggressive response more frequently than single officers. The breakdown analysis of the means and associated variances supported this finding. The chi-square test of significance for this variable is 0.065 and the subsequent T-test level of significance is 0.030.

TABLE XIV

Crosstabs Table of Marital Status vs Combat

CBT	COUNT ROW PCT COL PCT TOT PCT	MARRIED 1.	SINGLE 2.	ROW TOTAL
	0	2	3	5
		40.0	60.0	1.7
		1.0	3.7	
		0.7	1.0	
	1	28	10	38
		73.7	26.3	13.1
		13.5	12.2	
		9.7	3.5	
	2	47	22	69
		68.1	31.9	23.9
		22.7	26.8	
		16.3	7.6	
	3	52	27	79
		65.8	34.2	27.3
		25.1	32.9	
		18.0	9.3	
	4	52	18	70
		74.3	25.7	24.2
		25.1	22.0	
		18.0	6.2	
	5	26	2	28
		92.9	7.1	9.7
		12.6	2.4	
		9.0	0.7	
	COLUMN	207	82	289
	TOTAL	71.6	28.4	100.0
	MEAN	1.595	1.529	1.577

4. Basic Specialty/Combat

The cross-sectional analysis of the combat questions broken down by line, staff, and service support specialties shows a decreasing tendency for the selection of the risk aggressive question. The line officers' mean response of 1.60 was greater than the staff mean response of 1.56, which was in turn greater than the service support response of 1.52. Although the chi-square level of significance was only 0.176, the Kendall's level of significance was 0.064.

TABLE XV

Crosstabs Table of Grouped Basic Specialty vs Combat

CBT	COUNT ROW PCT COL PCT TOT PCT	LINE 1.	STAFF 6.	SVCSPTON 8.	ROW TOTAL
	0	1	2	2	5
		20.0	40.0	40.0	1.7
		0.7	2.2	3.8	
		0.3	0.7	0.7	
	1	20	14	4	38
		52.6	36.8	10.5	13.0
		13.3	15.7	7.5	
		6.8	4.8	1.4	
	2	30	20	20	70
		42.9	28.6	28.6	24.0
		20.0	20.5	37.7	
		10.3	6.8	6.8	
	3	41	24	15	80
		51.3	30.0	18.8	27.4
		27.3	27.0	28.3	
		14.0	8.2	5.1	
	4	43	18	9	70
		61.4	25.7	12.9	24.0
		28.7	20.2	17.0	
		14.7	6.2	3.1	
	5	15	11	3	29
		51.7	37.9	10.3	9.9
		10.0	12.4	5.7	
		5.1	3.8	1.0	
	COLUMN	150	89	53	292
	TOTAL	51.4	30.5	18.2	100.0
	MEAN	1.600	1.568	1.528	1.577

5. Combat Experience/Combat

The cross-sectional analysis of this variable indicates that respondents with combat experience tended to select the risk aggressive alternative more frequently than officers who did not have combat experience. This finding was again supported by the breakdown analysis. The chi-square test of significance for this variable is 0.143 and the subsequent T-test level of significance is 0.074.

TABLE XVI

Crosstabs Table of Combat Experience vs Combat

CBT	COUNT ROW PCT COL PCT TOT PCT	YES 1.	NO 2.	ROW TOTAL
	0	2	3	5
		40.0	60.0	1.7
		1.7	1.7	
		0.7	1.0	
	1	15	23	38
		39.5	60.5	13.0
		13.0	13.0	
		5.1	7.9	
	2	22	48	70
		31.4	68.6	24.0
		19.1	27.1	
		7.5	16.4	
	3	30	50	80
		37.5	62.5	27.4
		26.1	28.2	
		10.3	17.1	
	4	28	42	70
		40.0	60.0	24.0
		24.3	23.7	
		9.6	14.4	
	5	18	11	29
		62.1	37.9	9.9
		15.7	6.2	
		6.2	3.8	
	COLUMN	115	177	292
	TOTAL	39.4	60.6	100.0
	MEAN	1.610	1.556	1.577

6. Service Experience/Combat

The cross-sectional analysis of the level of service experience demonstrated that officers with greater than ten years experience answered the combat questions more frequently risk aggressive than officers with less than ten years of service. The breakdown analysis provided another perspective that supported this finding. The chi-square test of significance for this variable is 0.065 and the subsequent T-test level of significance is 0.030.

TABLE XVII

Crosstabs Table of Years of Service Experience vs Combat

CBT	COUNT ROW PCT COL PCT TOT PCT	< TEN YRS 1.	> TEN YRS 5.	ROW TOTAL
	0	3	2	5
		60.0	40.0	1.7
		2.0	1.4	
		1.0	0.7	
	1	20	18	38
		52.6	47.4	13.1
		13.4	12.7	
		6.9	6.2	
	2	40	30	70
		57.1	42.9	24.1
		26.8	21.1	
		13.7	10.3	
	3	44	35	79
		55.7	44.3	27.1
		29.5	24.6	
		15.1	12.0	
	4	35	35	70
		50.0	50.0	24.1
		23.5	24.6	
		12.0	12.0	
	5	7	22	29
		24.1	75.9	10.0
		4.7	15.5	
		2.4	7.6	
	COLUMN	149	142	291
	TOTAL	51.2	48.8	100.0
	MEAN	1.546	1.610	1.577

7. Expected Years of Service at Retirement/Combat

A cross-sectional analysis of the combat decision frame with the variable retirement showed that officers who planned to retire with greater than 20 years of service answered more frequently risk aggressive than officers who planned to retire with less than 20 years of service. The chi-square test of significance for this variable is 0.013 and the subsequent T-test level of significance is 0.130.

TABLE XVIII

Crosstabs Table of Retirement vs Combat

CBT	COUNT ROW PCT COL PCT TOT PCT	< 20 YRS 1.	> 20 4.	ROW TOTAL
	0	2	3	5
		40.0	60.0	1.8
		1.2	2.6	
		0.7	1.1	
	1	25	11	36
		69.4	30.6	12.8
		15.2	9.5	
		8.9	3.9	
	2	44	23	67
		65.7	34.3	23.8
		26.7	19.8	
		15.7	8.2	
	3	47	31	78
		60.3	39.7	27.8
		28.5	26.7	
		16.7	11.0	
	4	39	28	67
		58.2	41.8	23.8
		23.6	24.1	
		13.9	10.0	
	5	8	20	28
		28.6	71.4	10.0
		4.8	17.2	
		2.8	7.1	
	COLUMN	165	116	281
	TOTAL	58.7	41.3	100.0
	MEAN	1.545	1.624	1.578

8. Early Promotion/Combat

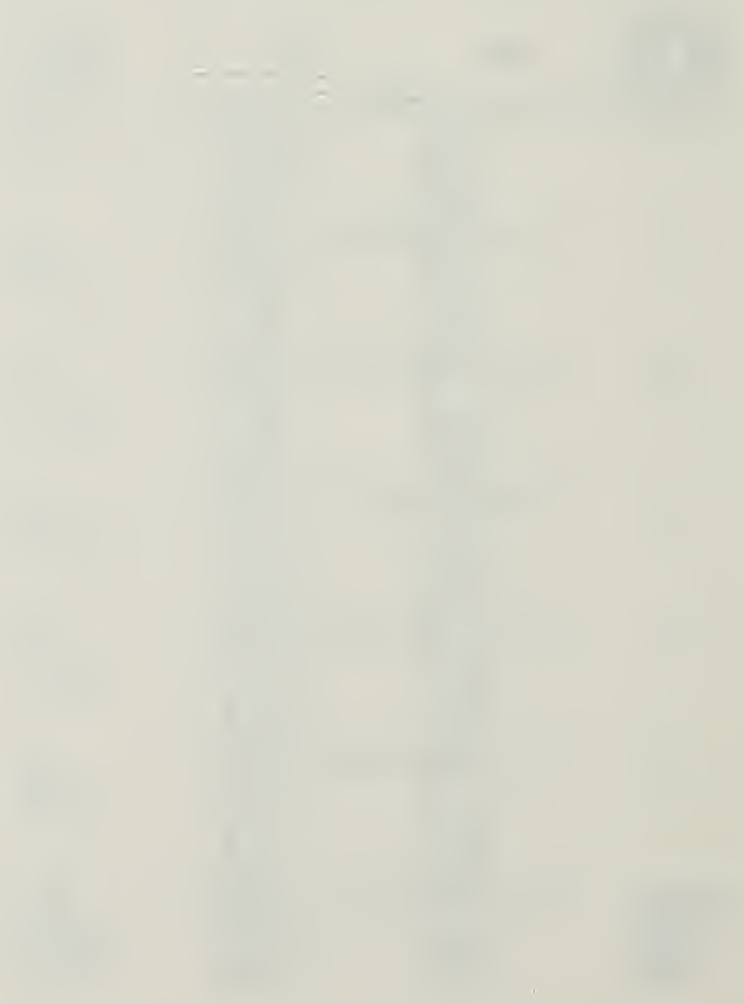
The cross-sectional analysis showed a preference for the risk aggressive response by respondents who had been selected for early promotion compared to those who had not been selected for early promotion. These results might be biased by the relatively low number of respondents who had been selected for early promotion. Despite the limitation, the chi-square test of significance for this variable is 0.043 and the subsequent T-test level of significance is 0.026.

TABLE XIX

Crosstabs Table of Early Promotion vs Combat

CBT	COUNT ROW PCT TOT PCT	YES 1.	NO 2.	ROW TOTAL
	0	0	5	5
		0.0	100.0	1.7
		0.0	2.0	
		0.0	1.7	
	1	4	34	38
		10.5	89.5	13.1
		11.1	13.3	
		1.4	11.7	
	2	6	64	70
		8.6	91.4	24.1
		16.7	25.1	
		2.1	22.0	
	3	8	71	79
		10.1	89.9	27.1
		22.2	27.8	
		2.7	24.4	
	4	9	61	70
		12.9	87.1	24.1
		25.0	23.9	
		3.1	21.0	
	5	9	20	29
		31.9	69.0	10.0
		25.0	7.8	
		3.1	6.9	
	COLUMN	36	255	291
	TOTAL	12.4	87.6	100.0
	MEAN	1.672	1.564	1.577

[illegible]



9. Command and General Staff College/Combat

The cross-sectional analysis of the variable CGSC shows officers who attended this school answered combat questions more frequently risk aggressive than officers who had not been selected. Since CGSC and War College are both service schools with highly competitive admission procedures and since the results of these variables essentially replicate each other, War College is not displayed as a separate variable. The chi-square test of significance for CGSC is 0.002 and the subsequent T-test level of significance is 0.004.

TABLE XX

Crosstabs Table of C&GSC vs Combat

CBT	COUNT ROW PCT COL PCT TOT PCT	YES 1.	NO 2.	ROW TOTAL
	0	0	5	5
		0.0	100.0	1.7
		0.0	2.3	
		0.0	1.7	
	1	9	29	38
		23.7	76.3	13.0
		12.3	13.2	
		3.1	9.9	
	2	13	57	70
		18.6	81.4	24.0
		17.8	26.0	
		4.5	19.5	
	3	16	64	80
		20.0	80.0	27.4
		21.9	29.2	
		5.5	21.9	
	4	19	51	70
		27.1	72.9	24.0
		26.0	23.3	
		6.5	17.5	
	5	16	13	29
		55.2	44.8	9.9
		21.9	5.9	
		5.5	4.5	
	COLUMN TOTAL	73	219	292
		25.0	75.0	100.0
	MEAN	1.655	1.552	1.577

10. Expected Highest Rank/Combat

The cross-sectional analysis of the variable EHRNK (expected highest rank) showed that officers who expected to attain the paygrade of 0-6 or above responded to the combat questions with the aggressive alternative more frequently than those who expected to only attain some lower paygrade. The chi-square test of significance for this variable is 0.009 and the subsequent T-test level of significance is 0.005.

TABLE XXI

Table of Expected Highest Rank vs Combat

CBT	COUNT ROW PCT COL PCT TOT PCT	LESS THAN 0-5 1.	0-6 AND ABOVE 6.	ROW TOTAL
	0	2 40.0 1.3 0.7	3 60.0 2.4 1.1	5 1.8
	1	25 71.4 16.0 8.9	10 28.6 7.9 3.5	35 12.4
	2	41 60.3 26.3 14.5	27 39.7 21.4 9.6	68 24.1
	3	43 55.8 27.6 15.2	34 44.2 27.0 12.1	77 27.3
	4	38 55.1 24.4 13.5	31 44.9 24.6 11.0	69 24.5
	5	7 25.0 4.5 2.5	21 75.0 16.7 7.4	28 9.9
	COLUMN TOTAL	156 55.3	126 44.7	282 100.0
	MEAN	1.542	1.627	1.580

11. Source of Commission/Combat

The cross-sectional analysis of the combat questions by the respondents' source of commission showed that Academy graduates answered more frequently aggressive than any of the other commission sources. In contrast, the direct commission officers were more frequently risk averse. The means ranged from 1.51 for the direct commission source to 1.70 for the Academy graduates. There is a general trend of increasing risk aggressiveness from direct commission to OCS to ROTC to Academy. The chi-square test of significance for this variable is 0.027 and the subsequent T-test level of significance is 0.002.

TABLE XXII

Crosstabs Table of Source of Commission vs Combat

COUNT ROW PCT COL PCT TOT PCT	ACADEMY 1.	ROTC 2.	OCS 3.	DIRECT 4.	ROW TOTAL
0	0	3	1	1	5
	0.0	60.0	20.0	20.0	1.7
	0.0	1.8	1.8	4.8	
	0.0	1.0	0.3	0.3	
1	2	27	8	1	38
	5.3	71.1	21.1	2.6	13.0
	4.0	16.3	14.5	4.8	
	0.7	9.2	2.7	0.3	
2	10	37	15	8	70
	14.3	52.9	21.4	11.4	24.0
	20.0	22.3	27.3	38.1	
	3.4	12.7	5.1	2.7	
3	11	48	14	7	80
	13.8	60.0	17.5	8.8	27.4
	22.0	28.9	25.5	33.3	
	3.8	16.4	4.8	2.4	
4	15	36	15	4	70
	21.4	51.4	21.4	5.7	24.0
	30.0	21.7	27.3	19.0	
	5.1	12.3	5.1	1.4	
5	12	15	2	0	29
	41.4	51.7	6.9	0.0	9.9
	24.0	9.0	3.6	0.0	
	4.1	5.1	0.7	0.0	
COLUMN	50	166	55	21	292
TOTAL	17.1	56.8	18.8	7.2	100.0
MEAN	1.700	1.559	1.546	1.514	1.577

F. ANALYSIS OF THE FINANCIAL VARIABLE

A cross-sectional analysis of the composite variable Finance against all of the demographic variables shows that eight variables provide statistically significant results from the matrix table of the significance tests. Similar to the sensitivity analysis done with the combat questions, Finance question 9 was evaluated and it was determined that the inclusion of this question did not significantly impact on the overall results. For example, the chi-square test of significance goes from 0.058 to 0.064 and rank improves from 0.054 to 0.022. The sensitivity analysis did not add or eliminate any demographic variables from consideration, thereby supporting the inclusion of the Finance question 9 in the Finance decision frame. The following results are noted:

1. Rank of Respondent/Finance

A cross-sectional analysis of the finance questions with the variable rank indicated that 0-1 answered more risk averse on this dimension than the other paygrades. 0-6 and above paygrades answered these questions more frequently in a risk aggressive manner than the other paygrades. The grand mean of 1.3 compared to the middle response of 1.5 for the finance questions indicates the risk averse alternative was selected more frequently than the risk aggressive alternative. An examination of the comparative means for each paygrade shows that there was a general trend for increasing risk aggressiveness across rank with the exception of the 0-5 response mean which was between the 0-2 and 0-3 response means. The standard deviations for this category ranged from a low of 0.17 for the 0-1 paygrade to 0.28 for the 0-6 and above paygrade. The chi-square

test of significance for the rank variable in this decision frame is 0.054 and the Kendall's correlation test of significance is 0.001.

TABLE XXIII

Crosstabs Table of Rank of Respondent vs Finance

COUNT ROW PCT COL PCT TOT PCT	0-1	0-2	0-3	0-4	0-5	0-6	ROW TOTAL
0	9	8	7	8	5	2	39
	23.1	20.5	17.9	20.5	12.8	5.1	13.2
	17.0	14.0	10.3	13.6	15.6	7.4	
	3.0	2.7	2.4	2.7	1.7	0.7	
1	26	31	27	20	13	8	125
	20.8	24.8	21.6	16.0	10.4	6.4	42.2
	49.1	54.4	39.7	33.9	40.6	29.6	
	8.8	10.5	9.1	6.8	4.4	2.7	
2	14	12	22	15	9	7	79
	17.7	15.2	27.8	19.0	11.4	8.9	26.7
	26.4	21.1	32.4	25.4	28.1	25.9	
	4.7	4.1	7.4	5.1	3.0	2.4	
3	4	4	10	14	4	5	41
	9.8	9.8	24.4	34.1	9.8	12.2	13.9
	7.5	7.0	14.7	23.7	12.5	18.5	
	1.4	1.4	3.4	4.7	1.4	1.7	
4	0	1	2	2	1	3	9
	0.0	11.1	22.2	22.2	11.1	33.3	3.0
	0.0	1.8	2.9	3.4	3.1	11.1	
	0.0	0.3	0.7	0.7	0.3	1.0	
5	0	1	0	0	0	2	3
	0.0	33.3	0.0	0.0	0.0	66.7	1.0
	0.0	1.8	0.0	0.0	0.0	7.4	
	0.0	0.3	0.0	0.0	0.0	0.7	
COLUMN	53	57	68	59	32	27	296
TOTAL	17.9	19.3	23.0	19.9	10.8	9.1	100.0
MEAN	1.249	1.268	1.321	1.339	1.294	1.437	1.309

2. Education Level/Finance

The cross-sectional analysis of the distribution of the responses to the finance questions broken down by the education level of the respondents showed that officers with advanced degrees (masters, etc.) answered these questions more frequently risk aggressive than officers who only had a four year degree, although both groups in general answered conservatively.

The chi-square test of significance for the education level variable in this decision frame is 0.048 and the Kendall's correlation test of significance is 0.001.

TABLE XXIV

Crosstabs Table of Education Level vs Finance

FIN	COUNT ROW PCT COL PCT TOT PCT	2YR COLLEGE 2.	4YR COLLEGE 3.	ADVANCED DEGREE 4.	ROW TOTAL
	0	0	28	11	39
		0.0	71.8	28.2	13.2
		0.0	15.4	10.4	
		0.0	9.5	3.7	
	1	6	85	34	125
		4.8	68.0	27.2	42.4
		85.7	46.7	32.1	
		2.0	28.8	11.5	
	2	1	45	33	79
		1.3	57.0	41.8	26.8
		14.3	24.7	31.1	
		0.3	15.3	11.2	
	3	0	19	22	41
		0.0	46.3	53.7	13.9
		0.0	10.4	20.8	
		0.0	6.4	7.5	
	4	0	0	0	8
		0.0	50.0	50.0	2.7
		0.0	2.2	3.8	
		0.0	1.4	1.4	
	5	0	1	2	3
		0.0	33.3	66.7	1.0
		0.0	0.5	1.9	
		0.0	0.3	0.7	
	COLUMN	7	182	106	295
	TOTAL	2.4	61.7	35.9	100.0
	MEAN	1.229	1.278	1.362	1.307

3. Combat Experience/Finance

This cross-sectional analysis of the combat experience variable shows that respondents that had combat experience answered the financial questions more frequently aggressive than respondents without combat

experience. Again both groups were relatively risk averse. The chi-square test of significance for this variable is 0.150 and the subsequent T-test level of significance is 0.033.

TABLE XXV

Crosstabs Table of Combat Experience vs Finance

FIN	COUNT ROW PCT COL PCT TOT PCT	YES 1.	NO 2.	ROW TOTAL
	0	13	26	39
		33.3	66.7	13.2
		11.3	14.4	
		4.4	8.8	
	1	45	80	125
		36.0	64.0	42.2
		39.1	44.2	
		15.2	27.0	
	2	30	49	79
		38.0	62.0	26.7
		26.1	27.1	
		10.1	16.6	
	3	18	23	41
		34.9	56.1	13.9
		15.7	12.7	
		6.1	7.8	
	4	7	2	9
		77.8	22.2	3.0
		6.1	1.1	
		2.4	0.7	
	5	2	1	3
		66.7	33.3	1.0
		1.7	0.6	
		0.7	0.3	
	COLUMN	115	181	296
	TOTAL	38.9	61.1	100.0
	MEAN	1.343	1.287	1.308

4. Years of Service Experience/Finance

The cross-sectional analysis of the finance variable with years of service experience shows that officers with greater than ten years of service experience more frequently selected the risk aggressive answer

than officers with less than ten years of service experience. The chi-square test of significance for this variable is 0.134 and the subsequent T-test level of significance is 0.013.

TABLE XXVI

Crosstabs Table of Service Experience vs Finance

FIN	COUNT ROW PCT COL PCT TOT PCT	< TEN YRS 1.	> TEN YRS 5.	ROW TOTAL
	0	21	18	39
		53.8	46.2	13.2
		13.9	12.5	
		7.1	6.1	
	1	73	52	125
		58.4	41.6	42.4
		48.3	36.1	
		24.7	17.6	
	2	38	41	79
		48.1	51.9	26.8
		25.2	28.5	
		12.9	13.9	
	3	16	24	40
		40.0	60.0	13.6
		10.6	16.7	
		5.4	8.1	
	4	2	7	9
		22.2	77.8	3.1
		1.3	4.9	
		0.7	2.4	
	5	1	2	3
		33.3	66.7	1.0
		0.7	1.4	
		0.3	0.7	
	COLUMN	151	144	295
	TOTAL	51.2	48.8	100.0
	MEAN	1.278	1.339	1.308

5. <u>Age of Respondent/Finance</u>

The cross-sectional analysis of the financial questions with the age of the respondents shows that the older the respondent, the more often he would select the risk aggressive response. The respondents that were 29 and below responded with a mean of 1.27, the 30-40 year olds' mean was

1.33, and the respondents over 40 answered with a mean response of 1.36. The chi-square test of significance for the age of respondent variable in this decision frame is 0.162 and the Kendall's correlation test of significance is 0.011.

TABLE XXVII

Crosstabs Table of Age vs Finance

FIN COUNT ROW PCT COL PCT TOT PCT	29 1.	30-39 2.	40 3.	ROW TOTAL
0	20	12	7	39
	51.3	30.8	17.9	13.2
	15.3	11.8	11.1	
	6.8	4.1	2.4	
1	62	40	23	125
	49.6	32.0	18.4	42.2
	47.3	39.2	36.5	
	20.9	13.5	7.8	
2	34	27	18	79
	43.0	34.2	22.8	26.7
	26.0	26.5	28.6	
	11.5	9.1	6.1	
3	12	20	9	41
	29.3	48.8	22.0	13.9
	9.2	19.6	14.3	
	4.1	6.8	3.0	
4	2	3	4	9
	22.2	33.3	44.4	3.0
	1.5	2.9	6.3	
	0.7	1.0	1.4	
5	1	0	2	3
	33.3	0.0	66.7	1.0
	0.8	0.0	3.2	
	0.3	0.0	0.7	
COLUMN	131	102	63	296
TOTAL	44.3	34.5	21.3	100.0
MEAN	1.273	1.325	1.356	1.310

6. <u>Selection for Early Promotion/Finance</u>

The cross-sectional analysis of the financial questions against selection for early promotion shows that respondents who were selected early for promotion selected the risk aggressive alternative more

frequently than respondents that were not selected early for promotion. Those officers who had been selected early for promotion also demonstrated the least averse preference with a mean of 1.417 as compared with a sample population mean of 1.309. The chi-square test of significance for this variable is 0.005 and the subsequent T-test level of significance is 0.009.

TABLE XXVIII

Crosstabs Table of Early Promotion vs Finance

FIN	COUNT ROW PCT COL PCT TOT PCT	YES 1.	NO 2.	ROW TOTAL
	0	2	37	39
		5.1	94.9	13.2
		5.6	14.3	
		0.7	12.5	
	1	13	111	124
		10.5	89.5	42.0
		36.1	42.9	
		4.4	37.6	
	2	8	71	79
		10.1	89.9	26.8
		22.2	27.4	
		2.7	24.1	
	3	8	33	41
		19.5	80.5	13.9
		22.2	12.7	
		2.7	11.2	
	4	3	6	9
		33.3	66.7	3.1
		8.3	2.3	
		1.0	2.0	
	5	2	1	3
		66.7	33.3	1.0
		5.6	0.4	
		0.7	0.3	
	COLUMN TOTAL	36	259	295
		12.2	87.8	100.0
	MEAN	1.417	1.294	1.309

7. Command and General Staff College/Finance

The cross-sectional analysis of selection for CGSC with the financial questions shows that officers who have been selected to attend answer the aggressive alternative more frequently than officers who have not been selected to attend the CGSC. The chi-square test of significance for this variable is 0.049 and the subsequent T-test level of significance is 0.011.

TABLE XXIX

Crosstabs Table of C&GSC vs Finance

FIN	COUNT ROW PCT COL PCT TOT PCT	YES 1.	NO 2.	ROW TOTAL
	0	8	31	39
		20.5	79.5	13.2
		11.0	13.9	
		2.7	10.5	
	1	24	101	125
		19.2	80.8	42.2
		32.9	45.3	
		8.1	34.1	
	2	21	58	79
		26.6	73.4	26.7
		28.8	26.0	
		7.1	19.6	
	3	13	28	41
		31.7	68.3	13.9
		17.8	12.6	
		4.4	9.5	
	4	5	4	9
		55.6	44.4	3.0
		6.8	1.8	
		1.7	1.4	
	5	2	1	3
		66.7	33.3	1.0
		2.7	0.4	
		0.7	0.3	
	COLUMN	73	223	296
	TOTAL	24.7	75.3	100.0
	MEAN	1.370	1.289	1.309

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

G. ANALYSIS OF THE CAREER VARIABLE

The cross-sectional analysis of the career composite variable against the demographic variables shows that only three variables have results which approach the significance level established for this study. The variables considered were rank, combat experience and source of commission. The sensitivity analysis of this variable when eliminating questions 12 and 14 significantly enhanced the results by increasing the number of variables which were acceptable under the established significance tests. This justified a separate evaluation of the decision frame without these two questions and the results of this evaluation are shown in subsection 4. An evaluation of all 5 questions in the career decision frame is presented first in order to be consistent with the previous decision frames and to contrast with the modified results.

1. Rank of Respondent/Career

The cross-sectional analysis of the career variable broken down by rank of respondent shows that the 0-6 and above paygrade answered more frequently risk averse than any other paygrade. At the other extreme, the 0-1 paygrade answered more frequently risk aggressive in the career dimension than any other paygrade. While the 0-3, 0-4, and 0-5 paygrades were very close in mean response, the 0-2 paygrade is notably higher, although still below the 0-1 paygrade response mean. The grand mean for the career variable was 1.57 indicating the overall responses to these questions were more risk aggressive than the middle response of 1.5. The chi-square test of significance for the rank variable in this decision frame is 0.200 and the Kendall's correlation test of significance is 0.004.

TABLE XXX

Crosstabs Table of Respondents Rank vs Career

COUNT							
ROW PCT			RANK				ROW
COL PCT							TOTAL
TOT PCT	0-1	0-2	0-3	0-4	0-5	0-6	
0	1	1	0	0	1	0	3
	33.3	33.3	0.0	0.0	33.3	0.0	1.0
	2.0	1.8	0.0	0.0	3.2	0.0	
	0.3	0.3	0.0	0.0	0.3	0.0	
1	4	1	6	6	3	7	27
	14.8	3.7	22.2	22.2	11.1	25.9	0.3
	7.8	1.8	9.0	10.3	9.7	25.9	
	1.4	0.3	2.1	2.1	1.0	2.4	
2	11	19	17	16	5	5	73
	15.1	26.0	23.3	21.9	6.8	6.8	25.2
	21.6	33.9	25.4	27.6	16.1	18.5	
	3.8	6.6	5.9	5.5	1.7	1.7	
3	16	21	29	23	14	8	111
	14.4	18.9	26.1	20.7	12.6	7.2	38.3
	31.4	37.5	43.3	39.7	45.2	29.6	
	5.5	7.2	10.0	7.9	4.8	2.8	
4	17	11	14	9	8	6	65
	26.2	16.9	21.5	13.8	12.3	9.2	22.4
	33.3	19.6	20.9	15.5	25.8	22.2	
	5.9	3.8	4.8	3.1	2.8	2.1	
5	2	3	1	4	0	1	11
	18.2	27.3	9.1	36.4	0.0	9.1	3.8
	3.9	5.4	1.5	6.9	0.0	3.7	
	0.7	1.0	0.3	1.4	0.0	0.3	
COLUMN	51	56	67	58	31	27	290
TOTAL	17.6	19.3	23.1	20.0	10.7	9.3	100.0
MEAN	1.596	1.575	1.561	1.562	1.561	1.518	1.566

2. Combat Experience/Career

The cross-sectional analysis of the career questions by level of combat experience indicates that officers with combat experience answered in a risk averse manner more frequently than those without combat experience. The chi-square test of significance for this variable is 0.196 and the subsequent T-test level of significance is 0.179.

TABLE XXXI

Crosstabs Table of Combat Experience vs Career

CAR	COUNT ROW PCT COL PCT TOT PCT	YES 1.	NO 2.	ROW TOTAL
	0	1	2	3
		33.3	66.7	1.0
		0.9	1.1	
		0.3	0.7	
	1	16	11	27
		59.3	40.7	9.3
		14.0	6.3	
		5.5	3.8	
	2	25	47	73
		35.6	64.4	25.2
		22.8	26.7	
		9.0	16.2	
	3	46	65	111
		41.4	58.6	38.3
		40.4	36.9	
		15.9	22.4	
	4	20	45	65
		30.8	69.2	22.4
		17.5	25.6	
		6.9	15.5	
	5	5	6	11
		45.5	54.5	3.8
		4.4	3.4	
		1.7	2.1	
	COLUMN TOTAL	114	176	290
		39.3	60.7	100.0
	MEAN	1.546	1.579	1.566

3. Source of Commission/Career

The cross-sectional analysis of the source of commission compared against the career questions shows that OCS officers were the most averse in their selection of responses while officers who received a direct commission and those who were Academy graduates were the most aggressive. The mean responses were 1.61 for Academy graduates, 1.56 for ROTC graduates, 1.53 for OCS graduates, and 1.61 for direct commissions. The chi-square

test of significance for the source of commission variable in this decision frame is 0.60 and the Kendall's correlation test of significance is 0.285.

TABLE XXXII

Crosstabs Table of Commission Source vs Career

COUNT ROW PCT COL PCT TOT PCT	ACADEMY 1.	ROTC 2.	OCS 3.	DIRECT 4.	ROW TOTAL
0	0	2	1	0	3
	0.0	66.7	33.3	0.0	1.0
	0.0	1.2	1.8	0.0	
	0.0	0.7	0.3	0.0	
1	2	14	8	3	27
	7.4	51.9	29.6	11.1	9.3
	3.8	8.6	14.5	14.3	
	0.7	4.8	2.8	1.0	
2	13	47	10	3	73
	17.8	64.4	13.7	4.1	25.2
	25.0	29.0	18.2	14.3	
	4.5	16.2	3.4	1.0	
3	18	59	26	8	111
	16.2	53.2	23.4	7.2	38.3
	34.6	36.4	47.3	38.1	
	6.2	20.3	9.0	2.8	
4	19	33	9	4	65
	29.2	50.8	13.8	6.2	22.4
	36.5	20.4	16.4	19.0	
	6.6	11.4	3.1	1.4	
5	0	7	1	3	11
	0.0	63.6	9.1	27.3	3.8
	0.0	4.3	1.8	14.3	
	0.0	2.4	0.3	1.0	
COLUMN	52	162	55	21	290
TOTAL	17.9	55.9	19.0	7.2	100.0
MEAN	1.608	1.558	1.534	1.561	1.566

4. Modified Career Decision Frame

As demonstrated in the sensitivity analysis, eliminating questions 12 and 14 from the career decision frame increased the number of variables considered statistically acceptable for analysis. The significance levels of the variables considered in the original grouping were improved and the additional variables of CGSC, Retirement, Age, and Early Promotion are also

significant. The variables of War College and Expected Highest Rank were also significant but were excluded since War College is related to the variable CGSC, and the latter variable was of relatively little interest.

The most pronounced change which results from the elimination of these questions is that the mean response for the new grouping is more aggressive than the old grouping at 1.76 to 1.57. Although both means are still more aggressive than the middle value of 1.5, the shift upward could be expected since the two questions eliminated were the most risk averse for the decision frame. The elimination of these questions resulted in a career decision frame which consisted of three questions which were more highly correlated with each other than the original five questions.

For the variable rank, the modified variable tends to group the O-1 to O-5 means tightly between 1.74 and 1.79 which makes any differences imperceptible. However, the O-6 and above mean response is significantly lower and the difference more extreme than in the original grouping.

For the variable Combat Experience, the new grouping essentially replicates the original results with those officers who had combat experience answering more frequently averse than officers without combat experience. However, using the modified grouping makes the difference between their means more dramatic as the means change from 1.54 and 1.58 to 1.71 and 1.78 respectively.

For the variable Source of Commission, the modified grouping of the career questions demonstrates that while the OCS officers remained the most relatively risk averse group with a mean of 1.71, the academy group instead of the direct commission group was the most risk aggressive with a

mean response of 1.81. The direct commission and ROTC groups were lumped together at 1.75.

The variable CGSC was determined to be significant under the modified grouping but was not significant when all the career questions were included in the analysis. The results show that those officers who had been selected for attendance at the Command and General Staff College were relatively more risk averse with a mean response of 1.67 than those officers not selected with a mean response of 1.78. The chi-square significance level for this variable was 0.012 and the T-Test significance level was 0.01.

The variable Age was determined to be statistically significant in the modified career decision frame with a Chi-Square of 0.002 and a T-Test of 0.08. Analysis of the basic results showed that officers who were greater than 40 years old answered these questions more frequently risk averse at 1.68 mean response than the younger officers. Those officers less than 30 years old were relatively the most aggressive at 1.79, and the 30-39 year age group were in the middle at 1.76. This variable was not significant under the original career frame grouping.

The variable Early Promotion was significant in this new grouping with a Chi-Square of 0.005 and a T-Test significance level of 0.05. The results indicate that those officers selected for early promotion were relatively more risk averse with a mean of 1.64 than those officers not selected with a mean response of 1.77. This variable was not significant in the original grouping.

H. ANALYSIS OF THE COMPOSITE SURVEY

The cross-sectional analysis of the variable survey created through a composite of the responses of all of the survey questions in the three decision frames, shows that seven variables pass the test of statistical significance. When the survey is broken down by the relevant decision frames, the sample population responded to the combat questions in the most risk aggressive manner with a mean response of 1.577; the finance questions in the most risk averse manner with a mean response of 1.309; and the responses to the career questions were grouped inbetween, with a slightly aggressive mean response of 1.566. The difference between these means were compared by use of the T-test. This evaluation showed a significance level of 0.000 between combat and finance, 0.000 between finance and career, and 0.546 between combat and career. Further evaluation of the means of combat and career was accomplished by use of the Wilcoxon and Sign tests. These tests demonstrated significance levels of 0.141 and 0.004 respectively. All other evaluations between the composite variable means resulted in significance levels consistent with the T-tests. The grand mean for the overall survey was 1.483 indicating that the most frequent response was risk averse, although marginally so. It is apparent that the overall tendency towards the risk averse answer was due to the responses in the financial variable. A review of the variances associated with these decision frames reveals that the sample population answered career questions with the greatest amount of consistency (variance 0.0427) and the combat questions with the least amount of consistency (variance 0.0618).

Due to the large size of the crosstabs tables for this section, for the convenience of the reader the tables have been moved to the end of this subsection. In addition, the following findings were noted:

1. Rank of Respondent/Survey

The cross-sectional analysis for the entire survey by the variable rank shows that the 0-1 paygrade answered the questions more frequently risk averse than any other paygrade. At the opposite extreme, the 0-6 and above paygrade were the most frequently risk aggressive in their responses. An analysis of the means shows that the range of the means goes from 1.45 to 1.58. There is a general trend upward between these values as the officer increases in paygrade with the exception of the 0-5 paygrade which falls between the 0-1 and 0-2 paygrade means. The chi-square test of significance for the rank variable across the survey is 0.200 and the Kendall's correlation test of significance is 0.004.

2. Sex of the Respondent/Survey

The cross-sectional analysis of the survey responses with the variable sex shows that male officers answered the questions more frequently risk aggressive than female officers. The chi-square test of significance for this variable is 0.188 and the subsequent T-test level of significance is 0.012.

3. Basic Specialty/Survey

The cross-sectional analysis of the survey responses with the variable Basic Specialty subgroups of line, staff, and service support, shows that line officers answered more frequently aggressive than any other group while service support officers were more frequently risk averse. A comparison of the means shows that staff officer responses were inbetween

these two extremes. The chi-square test of significance for the basic specialty variable in this decision frame is 0.206 and the Kendall's correlation test of significance is 0.020.

4. Age of Respondent/Survey

The cross-sectional analysis of the survey as compared with the relative age of the respondents shows that those officers that were less than 29 years old answered more frequently risk averse than any other age group. Officers who were over 40 years old answered the questions the most risk aggressively. Analysis of the difference between the means shows that there is a trend for officers to answer more aggressively as they increase in age. The chi-square test of significance for the age of the respondent variable in this decision frame is 0.179 and the Kendall's correlation test of significance is 0.046.

5. Selection for Early Promotion/Survey

The cross-sectional analysis of the survey responses broken down by the variable Early Promotion shows that officers who had been selected for early promotion answered the survey questions more frequently aggressive than their counterparts. The chi-square test of significance for this variable is 0.086 and the subsequent T-test level of significance is 0.028.

6. Selection for Command and General Staff College/Survey

The cross-sectional analysis of the survey responses broken down by whether an officer has been selected to attend CGSC shows that those officers who had been selected were more frequently aggressive in their responses than officers who had not been selected to attend. The chi-square test of significance for this variable is 0.181 and the subsequent T-test level of significance is 0.006.

TABLE XXXIII

Crosstabs Table of Rank vs Survey

COUNT ROW PCT COL PCT TOT PCT	RANK 0-1	0-2	0-3	0-4	0-5	0-6	ROW TOTAL
3	2	0	2	1	0	1	6
	33.3	0.0	33.3	16.7	0.0	16.7	2.1
	4.1	0.0	3.0	1.8	0.0	3.7	
	0.7	0.0	0.7	0.3	0.0	0.3	
4	4	4	2	3	3	0	16
	25.0	25.0	12.5	18.8	18.8	0.0	5.6
	8.2	7.1	3.0	5.3	9.7	0.0	
	1.4	1.4	0.7	1.0	1.0	0.0	
5	7	8	9	3	2	1	30
	23.3	26.7	30.0	10.0	6.7	3.3	10.5
	14.3	14.3	13.6	5.3	6.5	3.7	
	2.4	2.8	3.1	1.0	0.7	0.3	
6	9	14	14	11	8	4	60
	15.0	23.3	23.3	18.3	13.3	6.7	21.0
	18.4	25.0	21.2	19.3	25.8	14.8	
	3.1	4.9	4.9	3.8	2.8	1.4	
7	11	6	10	14	7	3	51
	21.6	11.8	19.6	27.5	13.7	5.9	17.8
	22.4	10.7	15.2	24.6	22.6	11.1	
	3.8	2.1	3.5	4.9	2.4	1.0	
8	8	11	11	10	4	3	47
	17.0	23.4	23.4	21.3	8.5	6.4	16.4
	16.3	19.6	16.7	17.5	12.9	11.1	
	2.8	3.8	3.8	3.5	1.4	1.0	
9	5	7	11	8	4	4	39
	12.8	17.9	28.2	20.5	10.3	10.3	13.6
	10.2	12.5	16.7	14.0	12.9	14.8	
	1.7	2.4	3.8	2.8	1.4	1.4	
10	1	2	5	4	2	5	20
	5.0	10.0	30.0	20.0	10.0	25.0	7.0
	2.0	3.6	9.1	7.0	6.5	18.5	
	0.3	0.7	2.1	1.4	0.7	1.7	
11	1	3	1	3	1	2	11
	9.1	27.3	9.1	27.3	9.1	18.2	3.8
	2.0	5.4	1.5	5.3	3.2	7.4	
	0.3	1.0	0.3	1.0	0.3	0.7	
12	1	1	0	0	0	3	5
	20.0	20.0	0.0	0.0	0.0	60.0	1.7
	2.0	1.8	0.0	0.0	0.0	11.1	
	0.3	0.3	0.0	0.0	0.0	1.0	
13	0	0	0	0	0	1	1
	0.0	0.0	0.0	0.0	0.0	100.0	0.3
	0.0	0.0	0.0	0.0	0.0	3.7	
	0.0	0.0	0.0	0.0	0.0	0.3	
COLUMN	49	56	66	57	31	27	286
TOTAL	17.1	19.6	23.1	19.9	10.8	9.4	100
MEAN	1.449	1.473	1.476	1.490	1.467	1.580	1.483

TABLE XXXIV

Crosstabs Table of Respondents Sex vs Survey

SURVEY	COUNT ROW PCT COL PCT TOT PCT	MALE 1.	FEMALE 2.	ROW TOTAL
3		4	2	6
		66.7	33.3	2.1
		1.5	11.1	
		1.4	0.7	
4		15	1	16
		93.8	6.3	5.6
		5.6	5.6	
		5.2	0.3	
5		26	4	30
		86.7	13.3	10.5
		9.7	22.2	
		9.1	1.4	
6		56	4	60
		93.3	6.7	21.0
		20.9	22.2	
		19.6	1.4	
7		47	4	51
		92.2	7.8	17.8
		17.5	22.2	
		16.4	1.4	
8		46	1	47
		97.9	2.1	16.4
		17.2	5.6	
		16.1	0.3	
9		38	1	39
		97.4	2.6	13.6
		14.2	5.6	
		13.3	0.3	
10		19	1	20
		95.0	5.0	7.0
		7.1	5.6	
		6.5	0.3	
11		11	0	11
		100.0	0.0	3.8
		4.1	0.0	
		3.8	0.0	
12		5	0	5
		100.0	0.0	1.7
		1.9	0.0	
		1.7	0.0	
13		1	0	1
		100.0	0.0	0.3
		0.4	0.0	
		0.3	0.0	
	COLUMN	268	18	286
	TOTAL	93.7	6.3	100.0
	MEAN	1.488	1.404	1.483

TABLE XXXV

Crosstabs Table of Basic Specialty vs Survey

SURVEY

COUNT ROW PCT COL PCT TOT PCT	LINE 1.	STAFF 6.	SVCSPT 8.	ROW TOTAL
3	3	1	2	6
	50.0	16.7	33.3	2.1
	2.0	1.1	3.9	
	1.0	0.3	0.7	
4	5	8	3	16
	31.3	50.0	18.8	5.6
	3.4	9.2	5.9	
	1.7	2.8	1.0	
5	14	10	6	30
	46.7	33.3	20.0	10.5
	9.5	11.5	11.8	
	4.9	3.5	2.1	
6	25	21	14	60
	41.7	35.0	23.3	21.0
	16.9	24.1	27.5	
	8.7	7.3	4.9	
7	26	15	10	51
	51.0	29.4	19.6	17.8
	17.6	17.2	19.6	
	9.1	5.2	3.5	
8	32	11	4	47
	68.1	23.4	8.5	16.4
	21.6	12.6	7.8	
	11.2	3.8	1.4	
9	25	6	8	39
	64.1	15.4	20.5	13.6
	16.9	6.9	15.7	
	8.7	2.1	2.8	
10	10	7	3	20
	50.0	35.0	15.0	7.0
	6.8	8.0	5.9	
	3.5	2.4	1.0	
11	6	5	0	11
	54.5	45.5	0.0	3.8
	4.1	5.7	0.0	
	2.1	1.7	0.0	
12	2	2	1	5
	40.0	40.0	20.0	1.7
	1.4	2.3	2.0	
	0.7	0.7	0.3	
13	0	1	0	1
	0.0	100.0	0.0	0.3
	0.0	1.1	0.0	
	0.0	0.3	0.0	
COLUMN	148	87	51	286
TOTAL	51.7	30.4	17.8	100.0
MEAN	1.496	1.476	1.455	1.483

TABLE XXXVI

Crosstabs Table of Age vs Survey

SURVEY	COUNT ROW PCT COL PCT TOT PCT	29 1.	30-39 2.	40 3.	ROW TOTAL
3		4	0	2	6
		66.7	0.0	33.3	2.1
		3.2	0.0	3.2	
		1.4	0.0	0.7	
4		7	5	4	16
		43.8	31.3	25.0	5.6
		5.6	5.1	6.5	
		2.4	1.7	1.4	
5		17	9	4	30
		56.7	30.0	13.3	10.5
		13.6	9.1	6.5	
		5.9	3.1	1.4	
6		26	24	10	60
		43.3	40.0	16.7	21.0
		20.8	24.2	16.1	
		9.1	8.4	3.5	
7		18	23	10	51
		35.3	45.1	19.6	17.8
		14.4	23.2	16.1	
		6.3	8.0	3.5	
8		25	13	8	47
		55.3	27.7	17.0	16.4
		20.8	13.1	12.9	
		9.1	4.5	2.8	
9		16	14	9	39
		41.0	35.9	23.1	13.6
		12.8	14.1	14.5	
		5.6	4.9	3.1	
10		5	8	7	20
		25.0	40.0	35.0	7.0
		4.0	8.1	11.3	
		1.7	2.8	2.4	
11		4	3	4	11
		36.4	27.3	36.4	3.8
		3.2	3.0	6.5	
		1.4	1.0	1.4	
12		2	0	3	5
		40.0	0.0	60.0	1.7
		1.6	0.0	4.8	
		0.7	0.0	1.0	
13		0	0	1	1
		0.0	0.0	100.0	0.3
		0.0	0.0	1.6	
		0.0	0.0	0.3	
	COLUMN	125	99	62	286
	TOTAL	43.7	34.6	21.7	100.6
	MEAN	1.468	1.480	1.517	1.483

TABLE XXXVII

Crosstabs Table of Early Promotion vs Survey

COUNT ROW PCT COL PCT TOT PCT	YES 1.	NO 2.	ROW TOTAL
3	0	6	6
	0.0	100.0	2.1
	0.0	2.4	
	0.0	2.1	
4	2	14	16
	12.5	87.5	5.6
	5.6	5.6	
	0.7	4.9	
5	1	29	30
	3.3	96.7	10.5
	2.8	11.6	
	0.4	10.2	
6	7	52	59
	11.9	88.1	20.7
	19.4	20.9	
	2.5	18.2	
7	6	45	51
	11.8	88.2	17.9
	16.7	18.1	
	2.1	15.8	
8	6	41	47
	12.8	87.2	16.5
	16.7	16.5	
	2.1	14.4	
9	5	34	39
	12.8	87.2	13.7
	13.9	13.7	
	1.8	11.9	
10	5	15	20
	25.0	75.0	7.0
	13.9	6.0	
	1.8	5.3	
11	1	10	11
	9.1	90.9	3.9
	2.8	4.0	
	0.4	3.5	
12	2	3	5
	40.0	60.0	1.8
	5.6	1.2	
	0.7	1.1	
13	1	0	1
	100.0	0.0	0.4
	2.8	0.0	
	0.4	0.0	
COLUMN	36	249	285
TOTAL	12.6	87.4	100.0
MEAN	1.535	1.476	1.483

TABLE XXXVIII

Crosstabs Table of C&GSC vs Survey

SURVEY	COUNT ROW PCT COL PCT TOT PCT	YES 1.	NO 2.	ROW TOTAL
	3	1	5	6
		16.7	83.3	2.1
		1.4	2.3	
		0.3	1.7	
	4	3	13	16
		18.8	81.3	5.6
		4.2	6.1	
		1.0	4.5	
	5	4	26	30
		13.3	86.7	10.5
		5.5	12.1	
		1.4	9.1	
	6	13	37	60
		21.7	78.3	21.0
		18.1	22.0	
		4.5	16.4	
	7	12	39	51
		23.5	76.5	17.8
		16.7	18.2	
		4.2	13.6	
	8	13	34	47
		27.7	72.3	16.4
		18.1	15.9	
		4.5	11.9	
	9	10	29	39
		25.6	74.4	13.6
		13.9	13.6	
		3.5	10.1	
	10	9	11	20
		45.0	55.0	7.0
		12.5	5.1	
		3.1	3.8	
	11	3	8	11
		27.3	72.7	3.8
		4.2	3.7	
		1.0	2.8	
	12	3	2	5
		60.0	40.0	1.7
		4.2	0.9	
		1.0	0.7	
	13	1	0	1
		100.0	0.0	0.3
		1.4	0.0	
		0.3	0.0	
	COLUMN	72	214	286
	TOTAL	25.2	74.8	100.0
	MEAN	1.522	1.469	1.483

I. SPEARMANS CROSS-CORRELATION TEST

A Spearmans correlation test was used to evaluate if any significant correlations existed between the demographic variables. It seems logical to assume that a number of these variables such as rank and age would be highly correlated and therefore may indicate if some of the analysis is redundant, or if these separate demographic variables can independently assist in explaining any observed variances. Using a Spearmans correlation coefficient of 0.75 as a subjective criterion for a significant correlation between the variables, only 6 out of 199 correlations examined were relevant. These six are provided in the following table:

TABLE XXXIX

Summary of Spearmans Cross-Correlations

RANK	RANK	RANK
CBTEXP	AGE	SVCEXP
0.7639	0.8481	0.8089
CBTEXP	CBTEXP	SVCEXP
SVCEXP	AGE	AGE
0.7437	0.7540	0.8168

V. CONCLUSIONS, QUALIFICATIONS AND RECOMMENDATIONS

The purpose of this chapter is to provide the concluding remarks on the basis of our analysis discussed above. Qualifications, and recommendations for further research are briefly discussed.

A. CONCLUSIONS

The analysis of the interaction of the demographic variables with the decision questions generated a number of interesting findings. While these findings necessarily represent a synthesis and correlation of the relatively large body of survey results, the primary focus was to glean some inferences about the data which could be understood and applied in the military environment.

Specifically, the analysis of these results provided some meaningful insight concerning the central research question of whether military officers demonstrate consistent preference for risk in the decisions they make. In addition, a number of tertiary but important conclusions were reached which both supported and contradicted several of the major research hypotheses. Finally, based on these results, some logical but qualified conclusions were reached which could be extrapolated for comparison with other research efforts. These conclusions, and the implications of them, are provided as follows:

1. Decision Frame Preference Shift

A general review of the overall results, considered in the macro sense, demonstrates two conclusions which are evident concerning the central research question.

First, it can be supported from the data that military officers alter or shift their preference for risk based on the decision frame they are confronted with. This phenomenon is most graphically apparent from an analysis of the sample population mean responses to the grouped decision frames. The officers answered these questions significantly different in each case. For example, the officers were relatively more risk aggressive in the combat decision frame than either of the other decision frames. Likewise, the officers were decidedly more risk averse in responding to the financial questions than either of the other decision frames. These noted differences were found to be statistically significant and therefore support the conclusion that the context or framing of the questions was a determinant variable in what preference for risk an officer demonstrated.

The implications of this research for the military in general and the Army in particular seem fruitful. The military is in many aspects a unique profession in terms of the expectations and demands it places on its officers. The variety and scope of the decisions a military officer is confronted with may demand unequal quotients of precision, resourcefulness, timeliness and conviction. Given these demands, it is essential that the military officer be flexible and adapt readily to the needs of the system. What this research demonstrates is a profile of an Army officer who recognizes the constraints which different decision frames pose and is flexible in the type of decisions made.

It was also evident that despite the shift in preference between the three decision frames, that the officers were relatively consistent within each specific frame. When the sample population was broken down by

various subgroupings such as rank, the manner in which these subgroups responded was essentially stable. The 0-1's and 0-6's were always the contrasting extremes for each decision frame and the remaining paygrades were usually sequential in the same relative order. This level of consistency within the subgroupings was supportive of the conclusion that while the population varied in its overall preference for risk according to the framing of the question, this variance was systematic and consistent rather than random.

The general results indicated that military officers are not consistently risk aggressive or averse throughout the realm of possible decisions. The interpretation of combat or line officers as being risk aggressive in all decisions is not supported. There is instead evidence that military officers alter their preference for risk based on the nature of the specific decision confronting them. Once the nature of the decision is isolated, it appears that the subgroupings of the military officers are consistent in their preference for risk.

2. Rank Relation to Combat Risk Preference

The hypothesis that the 0-1 paygrade would typically respond more risk averse than the 0-6 paygrade in the combat decision frame was supported by the survey response data. It seems logical to believe that the relative inexperience of the junior officers causes them to feel a greater degree of uncertainty, resulting in more risk averse responses than more senior officers, who necessarily have greater overall experience. Supporting the belief that experience was an important factor in the response preference for the combat decision frame were the results of the variables measuring combat experience and service experience. If a respondent had combat

experience, or if he had more than 10 years of service experience, he tended to respond to the combat questions more aggressively than if he did not have those attributes. Assuming the senior officers represent the successful "norm" for what the Army expects, the implication is that despite the ostensible combat training and simulated combat exercises junior officers are exposed to, they are relatively unwilling to exercise the same level of risk aggressiveness adopted by the more senior and experienced officers. What this may imply is that the nature of the current combat training is inadequate in terms of preparing junior officers to cope with the inherent risks associated with combat decisions. This is borne out by the comments attached to the returned questionnaires. Junior officers tended to want greater detail and clarification of the specifics surrounding the question than senior officers. The junior officers apparently wanted to reduce the uncertainty to the point where the risks were minimal. It may be assumed that this is reflective of the type of training they receive which stresses rational decision making where the outcomes and risks are clearly defined. On the other hand, perhaps this is as it should be. The Army may instead want to gradually develop its officers over time, expecting that experience rather than training will teach them to take the more aggressive risks.

In comparing the combat responses with paygrade, the curvilinear relationship expected inbetween these extreme response averages did not prove to be as consistent or systematically progressive as expected. For instance, a close look at the responses for the 0-4 and 0-5 paygrades shows very little difference between the mean response for each group, while the difference between the 0-5 and 0-6 paygrade is relatively more dramatic.

However, both the chi-square and the Kendall analysis data demonstrate significance levels which support the belief that the differences noted between the sample populations across the paygrades in the combat decision frame are not due to chance and that real differences exist.

3. Rank Relation to Finance Risk Preference

In the financial decision frame, the hypothesis that there would be a decreasing trend in preference for the risk aggressive response as the paygrade of the respondent increased was incorrect. Although with the exception of the 0-5 paygrade there was a progression, it was opposite to the hypothesis in that the 0-6 paygrade tended to answer more aggressively than the 0-1 paygrade. Where it was believed that the relative inexperience of the junior officer would tend to result in a greater exposure to the risky choice, it was in fact the years of experience and education level that seemed to increase the preference for risk aggressive response. In the financial decision frame, the chi-square and Kendall analysis demonstrate significance levels that support an increasing preference for risk across paygrade. Also relevant to the financial decision frame is the fact respondents that are financial officers by basic specialty responded more aggressively in this decision frame. Any conclusion about response preferences of finance officers must be qualified based on the fact that the purposive sample responses were not received and there were only nine respondents in this category and the fact that all the responses were weighted towards a preference for the averse response.

It would seem as though the purported scrutiny of financial decisions is feared the least by those who face these decisions routinely. It is plausible that constant exposure to a hazard of fiscal

irresponsibility relatively decreases ones sensitivity to it. Alternatively, another explanation is that the financial officer's familiarity of financial regulations allows him to operate more freely in an area where others are more greatly concerned with the pitfalls.

4. Rank Relation to Career Risk Preference

Within the career decision frame, it was hypothesized that junior officers would be typically risk aggressive while the middle grade officers would be more risk averse. These differences were expected because of the differing career needs, expectations and the relative perspective of these groupings.

The general results support the conclusion that most of the hypothesis is replicated in the data. Some consistent relationships exist even though some divergences from the hypothesis are apparent.

It was expected that the career questions would generate a large amount of variance within the sample population and this fact is supported by the data. Within this particular decision frame the officers seemed to be the most unsure of their responses. The officers were apparently more sensitive to the particular career situation depicted in the questions and tended to personalize their responses. This was borne out by the large number of personal comments concerning these questions which the respondents attached to the returned surveys. In addition, the sensitivity analysis conducted on this decision frame showed that eliminating certain questions altered the results thereby limiting the applicability of any conclusions based on these results.

Despite these qualifications, it can be generally concluded that the junior officers (0-1, 0-2) appear to be comparatively the most risk

aggressive paygrades in their selection of career alternatives. They were the most willing to aggressively risk their careers on the basis of principle or personal reasons rather than institutional needs as posed by the career questions. The results concerning the middle range officers (O-3, O-4, O-5) also support the hypothesis that these officers tended to be more risk averse than the junior officers when confronted with career and administrative decisions. However, the results do not support the hypothesis that senior officers (O-6 and above) revert to the risk aggressive response in making career decisions. Instead, this group was relatively more risk averse than any other group. Although a variety of explanations for this phenomenon is probably available, a plausible and intuitively appealing explanation is that the senior officers view their position as having the most to lose careerwise. Rather than being secure and accepting their relatively lofty career achievements, the senior officers are apparently still concerned with protecting or possibly improving their career gains. In contrast, the junior officers have relatively little career gains to risk and can afford to be more risk aggressive in the career decisions they face. They have little insight or experience within the institution to identify what the career penalties associated with the aggressive decisions could possibly be, and perhaps their excesses are often tolerated as a form of learning experience. The importance of experience as a moderating factor in the selection of the respective levels of risk preference is supported by the analysis of the variable service experience in this decision frame. This showed a high degree of support for the conclusion that the amount of service experience an officer had correlated with the rank variable.

5. Risk Preference and Military Success

Although not specifically addressed as an explicit hypothesis, it was felt that the results would provide some meaningful insight into the impact of the military system on the preference for risk an officer demonstrates. In essence, it was felt that the unique military environment with its own educational, promotional, and reward system might identify and encourage a specific type of risk preference within the officer corps.

The results of the survey provide prima facia evidence to conclude that the military system does in fact promote the officer who is risk aggressive. This is based on the high degree of correlation which was exhibited between all the measures of the successful officer included in the survey. These specific measures such as selection for early promotion, selection for Command and General Staff College, and O-6 and above in paygrade, all demonstrate that the successful military officer was generally more risk aggressive than the officers who had not yet achieved one of the measures of success. Thus, it seems likely that within the military environment the more risk aggressive officer is systematically characterized as potentially more successful when compared to his peers.

A comparison of the results of this survey with the results demonstrated by Kogan and Wallach [Ref. 17] concerning the variable age are especially meaningful. It was originally believed that the army population could be considered merely a subpopulation of the overall general population. Kogan and Wallach found that the general population tended to become more risk averse as age increased. In contrast, within this research effort a uniquely different result was demonstrated if one first

assumes the questionnaire was representative of all of the decision frames potentially facing an officer. Those officers who were less than thirty years old were the most risk averse and those over forty years old were the most risk aggressive in their responses. This leads to the conclusion that the military environment may be the moderating variable which is creating the difference between the findings. It seems plausible that the military system that encourages and promotes the risk aggressive officer will eventually weed out or change the less aggressive officer. The cultural and professional practicalities of such a system would eliminate the less aggressive officer either through peer pressure or through the "up or out" selection process. In any event, the resulting military environment is an officer corps which is predictably more risk aggressive with increasing age.

Another significant implication for the Army is whether they are producing the type of officer desired or are even aware of what this officer represents. In a very basic sense the risk averter can be considered a "yes-man" who is more comfortable accepting and following rather than creating, questioning, and leading. It seems therefore plausible that the ideal officer profile the Army as an organization wants to encourage and promote has a tendency toward seeking risk. This does not imply that being risk aggressive means that this officer will be reckless, foolhardy, and undaunted by even the most extreme odds. The distinction is instead made on the issue of whether the officer is risk averse or not. Officers seen as risk seekers may be viewed as imaginative, flexible in response to varying situations, and unafraid of having their actions challenged.

The present findings indicate that the military system is either consciously or unwittingly encouraging an officer of this genre. The success criterion established by the military system may have systematically rooted out the risk averse officer by eliminating him through promotion or cultural assimilation. The result is an organization that may be viewed as dominated not by yes-men, but officers who are moderately risk aggressive, especially in combat, but less so in finance and career. They seemingly understand the nuances of situational demands as evidenced by the decision frames and temper their aggressiveness accordingly.

6. Basic Specialty and Risk Preference

The results of the survey concerning the relationship of an officer's Basic Specialty and his preference for risk were of some interest because of the common perception that line officers tend to be more risk aggressive than staff officers. In general it can be concluded that this perception was supported. The combat specialty officers were generally more risk aggressive than the staff or service support specialties. Based on this and the earlier conclusions reached about the profile of the successful officer, it seems logical to conclude that not only are the combat specialties more aggressive, but they should have a higher percentage of "successful" officers than the other specialties if no overruling selection opportunities are established by higher authority.

7. Questionnaire Validation

There were two quick checks accomplished in order to support the validity of the questionnaire against previous works. First in Slovic's 1966 study, it was demonstrated that boys tended to prefer the more aggressive response over girls. While our study involved men and women,

and correcting for the paygrade disparity, the fact that male respondents tended to answer more aggressively than female respondents is at least not contradictory to this earlier study and at best is supportive of those findings. A second check was done by the relative scaling of questions two and three in the combat decision frame. As explained in the literature review, Tversky and Kahneman in 1979 discovered and discussed a theory called the scalar effect as part of the prospect theory [Ref. 11]. The dramatic increase in the preference for the risk averse answer as the magnitude of the effect was increased between combat questions two and three is in direct support of the scalar effect theory. In a similar manner, comparing the results demonstrated between career questions 15 and 12 may indicate that a scalar effect occurred. While no specific expected values are associated with the response alternatives, in a general sense the career penalties associated with these questions are dramatically different. Refusing to work late hours with your boss in question 15 may pale in comparison with the imagined penalties associated with being disloyal to or potentially embarrassing your boss in question 12. In any case, the results to these questions essentially replicate the effects noted in the combat questions and Tversky and Kahneman's studies. Analysis to determine if the officers were consistent between both sets of scalar questions somewhat supports the conclusion that the same officers who shifted their preference in the combat questions also shifted their preference in the career questions. This quasi-validation of these questions tends to lend support to the general question development methodology used.

8. Education and Risk Preference

There is common interest in the military community relating to conclusions that can be drawn relating to an officer's education. As related to the findings in the results section, it is plausible that an officer's source of commission could provide him with a greater or lesser amount of experience within a decision frame. For instance, it is generally accepted that an officer who graduates from the Academy would have more military training than other commission sources. Therefore, it would be expected based on the varying experience levels of the relevant commission sources, that the greater the degree of military training, the more aggressive the responses would be in the combat decision frame. This hypothesis was supported by the results. It should also be noted that the combat decision frame is the only one in which Academy graduates could be significantly differentiated from the other commission sources.

For further evidence that experience may be a key variable in the risk preference of an officer, the variable education level was analyzed. Since a postgraduate education typically includes courses in financial management, it would be expected, and was supported in the results, that these respondents answered more aggressively than other respondents who had not received a postgraduate education. This preference remained even after sorting out the 0-1 and 0-2 responses from the sample. This deletion was an attempt to reduce the influence of age on the results since it was unlikely that the 0-1 and 0-2 respondents had received a postgraduate education.

Additionally, officers with combat experience answered combat questions more aggressively and finance officers answered finance questions

more aggressively than the remaining sample population. Since in all of these situations involving experience the respondents responded more aggressively in (and only) in the area in which their greater experience existed; experience is supported as a key determinant in an officer's preference for risk.

B. QUALIFICATIONS

Although the conclusions provided are logical and consistent with the data results reported, it is necessary to qualify the ability to generalize the results of these findings.

First, it is recognized that the sample did not prove to be statistically related to the distribution of the overall Army officer population when comparing the distribution of the officers by rank because the survey sample was essentially purposive. However, a general comparison of the distribution of the sample by rank, sex, marital status and basic specialty shows a reasonable degree of randomness and correlation with the overall Army population. While it was assumed that the rotation practice of the Army would eliminate or minimize any geographic bias resulting from the sampling technique, it is also possible that assignments based on preference may have an influence in this area.

Secondly, the validity of the instrument needs to be qualified. The instrument was linked conceptually to several previous risk/decision questionnaires and the results have been shown to generally replicate other research efforts along some common variables. In addition, the instrument was pretested and modified to provide greater validity. Despite these efforts, the uniqueness of the instrument in terms of military questions and decision frames essentially relies on face validity for verification.

The survey responses contained a number of critical comments on the lack of variety of choices or inappropriate choices provided. Several officers expressed a desire for more scenario detail or more data in order to reach a decision.

Finally, the overall conclusions must be tempered with the realization that a number of institutional as well as personal biases may be evident. The particular selection of demographic variables to be considered necessarily represents a personal bias towards which variables are important to measure. On an even larger scale, the selection of which decision alternative was risk aggressive or risk averse could sometimes be argued to be a subjective preference on the part of the researchers, even though these determinations were validated by the pretests. The determination of the "successful officers" and the variables which would describe this officer are largely reflective of the institutional bias of what this officer does or has accomplished. It can be logically assumed that an 0-6 has positive OER's, has attended the Command and General Staff College as well as the War College, so the fact that all of these measures correlate is not unusual.

C. RECOMMENDATIONS

Based on the results demonstrated and conclusions reached, a number of reasonable recommendations seem appropriate. These recommendations are generally a recognition of the limitations inherent in this research effort as well as the opportunity to expand on and improve the research.

1. Since this research effort concentrated exclusively on the Army, the generalizability of the results to all military officers is limited.

Therefore, an extension of the study to either the Navy or Air Force would not only improve the generalizability of the results, but also tend to validate the conclusions.

2. Although the inherent difficulties of a longitudinal study in the military are recognized, such a study would isolate whether the military system encourages risk aggressive behavior in its officers.

3. Lacking a longitudinal study, a significant effort should be made to examine whether the military system is systematically "weeding out" the risk averse officer. Important variables to be examined include the promotion system, the educational system, and cultural or environmental impacts.

4. An improvement in the randomness of the sample would provide more generalizable results and possibly increase the confidence in the conclusions reached.

5. Given the volume of the data generated and the wide variety of statistical techniques available, it is possible that an alternate approach might expand on the results reached.

6. Although this instrument was tailored for use in a military environment, it is recognized that a similar research effort in the civilian business community might prove fruitful in determining whether the results replicate or contrast with this effort.

APPENDIX A

NAVAL POSTGRADUATE SCHOOL
MONTEREY CALIFORNIA 93940

19 August 1982

MEMORANDUM

From: CPT Douglas Hayden (USA) and LT James Thomas (USN)
To: Questionnaire Recipients

Subj: Explanation and Instructions for Decision Survey

1. The purpose of this memorandum is to request your assistance in a research project being conducted at the Naval Postgraduate School, Monterey, California. We are interested in evaluating differences in the manner in which Army officers make decisions. The enclosed questionnaire is intended to explore the judgements of officers confronted with a variety of simulated military situations. The research from this survey will compare responses over a number of demographic aspects such as rank, experience, and military specialty. One of the features of this research effort will be to assess differences in decision making among various categories of officers.

2. The questionnaire asks you to imagine you are in a number of military organizational settings in which you may or may not have had direct personal experience. There are no right or wrong answers. What is important is that you respond to each question based on your own assessment of the situation utilizing your own intuition and knowledge. The numbers used for describing certain situations (i.e. company size, etc.) may vary slightly from your personal experience, and there may be other alternative courses of action you may prefer. However, for the purposes of the study it is important that you imagine you are involved in the setting as described and choose from the alternatives offered.

3. Since this survey is anonymous, your individual responses will remain confidential. Only group data will be compared and analyzed for relevant results.

4. Pretests have shown that entire questionnaire can be completed in less than 20 minutes. Since the success of this project is totally dependent on your active participation, your cooperation is greatly appreciated.

DEMOGRAPHICS

Please check or write in the appropriate answer.

1. Rank: (0-1, 0-2, 0-3, etc.) ______________.
2. Male ______ Female ______
3. Married ______ Single ______
4. Education level completed: High School ____ 2yr College ____

   4 yr College ____ Advanced Degree ____
5. Your basic specialty is: ____
6. Have you ever served in a combat zone? Yes ____ No ____
7. Years of Active Duty Service: ________________
8. How many years of service do you plan to have when you retire? ____________
9. What is your age? ______
10. Have you ever been selected for early promotion? Yes ____ No ____
11. Have you ever been selected for the Command and General Staff College?

    Yes ____ No ____
12. Have you ever been selected to attend any of the War Colleges?

    Yes ____ No ____
13. How would you characterize your OER scores compared to your peers?

    Top Third ____ Middle Third ____ Lower Third ____
14. How would you characterize your actual performance compared to your peers? Top Third ____ Middle Third ____ Lower Third ____
15. What is the highest rank you expect to attain? ________________
16. What was your source of commission? Academy ____ ROTC ____

    OCS ____ Other ____

DECISION QUESTIONNAIRE

1. Imagine you are an infantry Company Commander with an augmented company of 300 men which is expecting an enemy attack likely to kill 100 of your men. Two alternative action plans have been developed. Assume that the consequences of the two plans are:

Alternative A: If Plan (A) is adopted an additional 25 people out of the expected 100 fatalities will be saved.

Alternative B: If Plan (B) is adopted there is a 1/4 probability that all 100 of the expected fatalities will be saved and a 3/4 probability none of the 100 will be saved.

As Company Commander you would choose alternative __________.

2. Your infantry company of 300 men has been tasked with achieving a vital objective currently held by an inferior enemy force. The two possible plans to achieve your mission have the following consequences:

Plan A: It has been determined that you would achieve your objective but suffer losses of 5 men.

Plan B: It has been determined that you would achieve your objective but the losses could either be 10 men if detected early (50% chance), or no losses if undetected (50% chance).

As Company Commander you would choose plan ________.

3. If intelligence had underestimated the strength of the enemy in the scenario described above with the following revised estimates:

Plan A: 140 casualties

Plan B: 280 casualties (50% chance), or no losses (50% chance)

Still achieving your objective with either plan as Company Commander you would choose plan ________.

4. Imagine you are a Division Commander with 9000 combat soldiers. You have been ordered to develop an attack scenario and your staff has recommended the following alternatives:

Alternative A: Attack using all existing resources with no reserves. There is an estimated 90% chance of success. There will be no losses if successful, but failure would result in the loss of 6000 soldiers.

Alternative B: Attack commiting 6000 soldiers and holding 3000 in reserve. This plan has an estimated 60% chance of success, but failure would result in loss of 1500 soldiers.

As Division Commander you would choose alternative ________.

5. Imagine you are a Company Commander with your augmented company of 300 soldiers pinned down by enemy fire 50 yeards from your position. Faced with the following options:

Alternative A: A conventional attack which would result in 40 of your men being killed while eliminating the enemy.

Alternative B. Calling in an air strike on essentially your own position which would eliminate the enemy but also has a 40% chance of killing 100 of your own men.

You would choose ________.

6. You are the Division Budget Officer for a Fort Ord sized post (10,000 soldiers) and you have developed a budget that you believe to be credible as well as easy to defend. You face the following choice:

A: Forward that budget and justification intact when requesting funds.

B: Inflate the estimate in order to try to hedge against potential cuts. This action makes the justification less believable.

You would choose________.

7. Imagine you are a new Transportation Officer responsible for 600 vehicles. You currently have 100 vehicles on your deadline and are receiving "heat" about reducing this figure to 60 which has been the established standard for your organization. You face the following choice:

A): Purchase the parts through the supply system. This option should get all of the needed parts within 4 months and repair of the vehicles will take 1 month (5 months total).

B): Cannabilize some of the down vehicles to fix others. This can get 40 additional vehicles up in one month, however this alternative is expected to result in a higher breakdown rate which will cost more in the long run.

You would choose ________.

8. Imagine you are in a management position responsible for executing a $5 million budget. At year end you find that you have not been required to use any part of your $250,000 contingency fund. You anticipate next year's budget needs to be similar to this year's. You face the following choices:

A): Turn the money back in. If the money is turned back in, next year's budget plan will be reduced by 10% of the returned money by higher authority ($25K reduction).

B): Spend the money on a one time questionable expense. Due to the nature of this one time expense, it has a 20% chance of being identified by the higher authority. If detected it would result in your budget being reduced by $125,000 next year.

You would choose ________.

9. Imagine you are the Financial Officer responsible for obligating a $10 million budget. Policy guidelines recommend that you maintain a 6% contingency fund against unforseen developments (requirements). In the past 5 years the unit has actually needed no more than 2 1/2% of the contingency fund. The money not spent on contingencies remains in your

control but due to timing problems it can never be spent efficiently. You would establish the following contingency fund level for this year's budget at:

A): 6%
B): 5%
C): 4%
D): 3%
E): 2 1/2%

You would choose ________.

10. As the Financial Officer of a division sized post, which expenditure plan would be preferred:

A): Obligate your budget at a consistent rate through the relevant period.
B): Obligate the bulk of the budget early in the period and the remainder consistent through the period.
C): Restrict expenditures early and obligate the bulk of the budget late in the period.

You would choose ________.

11. Imagine your Assignment Officer has just discussed your next assignment with you. He has offered you a choice of the following 3-year assignments:

A): An assignment which he categorizes as career enhancing "from a professional standpoint". However, this assignment will require maximum commitment and performance in order to excell. This assignment would have a negative impact on your family due to your extended work schedule and lack of local recreation opportunities.

B): An assignment which is not as professionally demanding but one in which you are confident you will do well. This assignment is very appealing to your family due to the desirability of the area and because you would have more free time.

You would choose ________.

12. Imagine that you are an 0-3 and you were previously given an important assignment by your boss (an 0-5) and you have given him your recommendations. Even though you have carried the discussion as far as you can with him, he still disagrees with your conclusion. You still feel strongly about your conclusion and he is about to make his recommendation up the chain withholding your data in his presentation. You face the following choice:

A): Say nothing more - at this point you are assured of an outstanding OER and probable promotion on the next board based on your work so far.

B): Find a way to get the information around your boss. Since this could place your boss in a potentially embarrassing situation, there is a 50/50 chance that it will negatively impact on the tone of your OER.

You would choose ________.

13. Imagine you are an 0-4 who desires to get a graduate education. Your Assignment Officer has discussed the following options:

A): An assignment in your specialty which will keep you in the "mainstream" for career purposes. Your new boss is said to encourage his officers to pursue a graduate education on their own time after hours.

B): An assignment at a fully funded graduate education program at a civilian institution. This assignment will take you out of the "mainstream" as far as your career pattern is concerned, but will ensure that you get a better education with less personal hardship.

You would choose ________.

14. Imagine you are a division Staff Officer responsible for originating correspondence to the Department of the Army and other major Headquarters. Which is more important to you:

A): Format

B); Content

C): Content and format equally

You would choose ________.

15. You are in a job that can be accomplished in a normal work day. Your boss (an 0-6) spends several hours a day in casual conversations and likes to catch up on his work by staying late and also by working occasionally on weekends. As an 0-4 faced with the following choices:

A): Get your work done and leave based on the normal work schedule.

B): Spread your workload out to more closely match your boss's schedule.

You would choose _________.

Thank you for taking the time to respond to this questionnaire.

APPENDIX B

FREQUENCY DISTRIBUTIONS

Demographics

SEX OF RESPONDENT

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)
MALE	1.	276	92.9
FEMALE	2.	21	7.1
	TOTAL	297	100.0

MARITAL STATUS

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)
MARRIED	1.	210	70.7
SINGLE	2.	84	28.3
	0.	3	1.0
	TOTAL	297	100.0

YEARS OF SERVICE EXPERIENCE

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)
TEN YRS	1.	152	51.2
TEN YRS	5.	144	48.5
	0.	1	0.3
	TOTAL	297	100.0

AGE OF RESPONDENT

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE REQ (PCT)
29	1.	132	44.4
30-39	2.	102	34.3
40	3.	63	21.2
	TOTAL	297	100.0

CGSC

CATEGORY LABEL	CODE	ABSOLUT FREQ	RELATIVE FREQ (PCT)
YES	1.	73	24.6
NO	2.	224	75.4
	TOTAL	297	100.0

WAR COLLEGE

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)
YES	1.	22	7.4
NO	2.	275	92.6
	TOTAL	297	100.0

OER AS COMPARED TO PEERS

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)
TOP THIRD	1.	228	76.8
MIDDLE THIRD	2.	62	20.9
LOWER THIRD	3.	2	0.7
	0.	5	1.7
	TOTAL	297	100.0

ACTUAL PERFORMANCE AS COMPARED TO PEERS

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)
TOP THIRD	1.	259	87.2
MIDDLE THIRD	2.	35	11.8
LOWER THIRD	3.	2	0.7
	0.	1	0.3
	TOTAL	297	100.0

EXPECTED HIGHEST RANK

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)
LESS THAN 0-5	1.	159	53.5
0-6 AND ABOVE	6.	127	42.8
	0.	11	3.7
	TOTAL	297	100.0

CBT1

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)
AVERSE	1.	115	38.7
AGGRESSIVE	2.	180	60.6
	0.	2	0.7
	TOTAL	297	100.0

CBT2

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)
AVERSE	1.	49	16.5
AGGRESSIVE	2.	247	83.2
	0.	1	0.3
	TOTAL	297	100.0

CBT3

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)
AVERSE	1.	148	49.8
AGGRESSIVE	2.	148	49.8
	0.	1	0.3
	TOTAL	297	100.0

CBT4

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)
AVERSE	1.	143	48.1
AGGRESSIVE	2.	151	50.8
	0.	3	1.0
	TOTAL	297	100.0

CBT5

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)
AVERSE	1.	167	56.2
AGGRESSIVE	2.	128	43.1
	0.	2	0.7
	TOTAL	297	100.0

```
FIN6
                                                 RELATIVE
                                     ABSOLUTE      FREQ
CATEGORY LABEL             CODE        FREQ        (PCT)
AVERSE                      1.          253         85.2
AGGRESSIVE                  2.           44         14.8
                                     ------       ------
                           TOTAL        297        100.0
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FIN7
                                                 RELATIVE
                                     ABSOLUTE      FREQ
CATEGORY LABEL             CODE        FREQ        (PCT)
AVERSE                      1.          225         75.8
AGGRESSIVE                  2.           72         24.2
                                     ------       ------
                           TOTAL        297        100.0
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FIN8
                                                 RELATIVE
                                     ABSOLUTE      FREQ
CATEGORY LABEL             CODE        FREQ        (PCT)
AVERSE                      1.          246         82.8
AGGRESSIVE                  2.           51         17.2
                                     ------       ------
                           TOTAL        297        100.0
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FIN9
                                                 RELATIVE
                                     ABSOLUTE      FREQ
CATEGORY LABEL             CODE        FREQ        (PCT)
AVERSE                      1.           83         27.9
AGGRESSIVE                  2.          213         71.7
                            0.            1          0.3
                                     ------       ------
                           TOTAL        297        100.0
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FIN10
                                                 RELATIVE
                                     ABSOLUTE      FREQ
CATEGORY LABEL             CODE        FREQ        (PCT)
AVERSE                      1.          217         73.1
AGGRESSIVE                  2.           79         26.6
                            0.            1          0.3
                                     ------       ------
                           TOTAL        297        100.0
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CAR11
                                                    RELATIVE
                                        ABSOLUTE      FREQ
CATEGORY LABEL              CODE          FREQ        (PCT)
AVERSE                       1.            94         31.6
AGGRESSIVE                   2.           201         67.7
                             0.             2          0.7
                                        -------     -------
                            TOTAL         297        100.0
```

```
CAR12
                                                    RELATIVE
                                        ABSOLUTE      FREQ
CATEGORY LABEL              CODE          FREQ        (PCT)
AVERSE                       1.           231         77.8
AGGRESSIVE                   2.            63         21.2
                             0.             3          1.0
                                        -------     -------
                            TOTAL         297        100.0
```

```
CAR13
                                                    RELATIVE
                                        ABSOLUTE      FREQ
CATEGORY LABEL              CODE          FREQ        (PCT)
AVERSE                       1.            86         29.0
AGGRESSIVE                   2.           211         71.0
                                        -------     -------
                            TOTAL         297        100.0
```

```
CAR14
                                                    RELATIVE
                                        ABSOLUTE      FREQ
CATEGORY LABEL              CODE          FREQ        (PCT)
AVERSE                       1.           195         65.7
AGGRESSIVE                   2.           102         34.3
                                        -------     -------
                            TOTAL         297        100.0
```

```
CAR15
                                                    RELATIVE
                                        ABSOLUTE      FREQ
CATEGORY LABEL              CODE          FREQ        (PCT)
AVERSE                       1.            34         11.4
AGGRESSIVE                   2.           261         87.9
                             0.             2          0.7
                                        -------     -------
                            TOTAL         297        100.0
```

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